### **APPENDIX I**

## SOCIOECONOMIC STUDY FOR THE HARDWOOD RANGE EXPANSION

## Final Socioeconomic Study for the Hardwood Range Expansion

September 1998

Air National Guard Readiness Center

ENVIRONMENTAL DIVISION Andrews AFB, MD 20762-5157

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Prepared for

#### Air National Guard Readiness Center

Environmental Division Andrews AFB, MD 20762-5157

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#### HARDWOOD RANGE EXPANSION

#### **Socioeconomic Study**

#### **EXECUTIVE SUMMARY**

The Hardwood Range Expansion Socioeconomic Study has been prepared for the Air National Guard (ANG) to identify potential impacts to existing socioeconomic conditions associated with the proposed expansion by 7,137 acres of the Hardwood Air-to-Ground Gunnery Range, located in central Wisconsin. The Volk Field Combat Readiness Training Center (CRTC), which is located at Volk Field Air National Guard Base (ANGB), Wisconsin, operates the existing Hardwood Range in Juneau County. Volk Field ANGB contributes over \$25 million annually to the regional economy through payrolls, construction expenditures, purchases of supplies and services, deployed personnel spending, and related secondary expenditures. While most of these purchases take place within the two-county region of influence (ROI) identified for this report (Juneau County and Wood County), with the largest share going to Juneau County, some of these purchases occur beyond the ROI. Juneau County, the location of the existing range, and Wood County, the location of the proposed range expansion, had total earnings from all industries of \$240 million and \$1.3 billion respectively, in 1994, the most recent year for which data is available. The proposed range expansion would potentially affect financial conditions and other related socioeconomic conditions in the local area.

A separate document, the Environmental Impact Statement (EIS) for the Hardwood Range Expansion and Related Airspace Actions, is being completed by the ANG to address the expansion proposal. The EIS will also address potential impacts on a wide range of environmental resources from expansion of the range, in addition to a number of changes in airspace configuration in the vicinity of the range. The EIS will incorporate portions of the socioeconomic information presented in this study. The EIS is a legally required document prepared to meet requirements of the National Environmental Policy Act (NEPA). The Socioeconomic Study is designed to provide supplementary information to Air Force decisionmakers and assistance to the State of Wisconsin, local governments, and other agencies in assessing potential socioeconomic effects of the proposal, and is not a legally required document.

An additional document, Land Use Management Guidelines for the Hardwood Air-To-Ground Gunnery Range, will also be completed that will identify land use and resource management guidelines for the operation of the expanded range.

The ROI is defined as the geographic area containing the following jurisdictions: Wood County, Juneau County, the towns of Port Edwards and Remington, the Pittsville School District, and the Nekoosa School District. Although Juneau County is part of the ROI, information provided on Juneau County describes only the existing socioeconomic conditions, since it is the county in which the existing range is located, whereas the range expansion would occur in Wood County. The EIS will have an expanded ROI because of the environmental impacts related to changes in airspace, which are not part of this study.

The Socioeconomic Study examines three options for acquiring land to expand the existing range. The first option (Option 1) is fee simple purchase of 7,137 acres of land by the Federal

government for the range expansion, including 6,162 acres of County Forest Land (CFL) owned and managed by Wood County and 975 acres of private land. Two other options entail the Federal government leasing rather than purchasing this land, either from the existing owners (i.e., Wood County and private owners) (Option 2) or from the State of Wisconsin Department of Military Affairs (Option 3).

Potential socioeconomic effects common to all three options include:

- Acquisition of public lands (Wood County land) and withdrawal of 6,162 acres of public lands from the CFL program.
- Acquisition of 975 acres of private lands.
- Relocation of seven year-round residences (three site-built single family residences, and four mobile homes) and six seasonal residences.
- Loss of agricultural use and timber revenues on private lands, including relocation of a cranberry farm.
- Reduction in the value of CFL timber sales (i.e., stumpage value) in the expansion area
- Potential reduction in wages and earnings from paper and lumber products manufacturing and related transportation.
- Withdrawal of approximately 280 acres of private lands entered in forest tax contracts and payments to offset past tax reductions.
- Reduction of public recreation access and use of the expansion area for hunting, trapping, hiking, wildlife viewing, and other forms of recreation; closure or relocation of six miles of state snowmobile trails.
- Closure of approximately 12 miles of public roads through the expansion area.
- Following implementation of any of the range expansion options, a separate local action
  which may be taken would involve Wood County replacing 6,162 acres of publicly
  managed county forest withdrawn as a result of the range expansion, with private, state,
  or Federal lands located elsewhere in the county. This action would remove private
  lands from the tax base, decrease revenues to local jurisdictions, and depending upon
  existing uses, could change the amount of land available for recreation, forest
  management, and related uses.
- Operation of a military training range would require restrictions on land uses and
  activities regardless of whether this action is associated with Federal purchase or
  Federal leasing of lands. Effects on residential land use, recreation, forestry, and
  agriculture are likely to be similar under each of the three land acquisition methods.
  However, since Federal or state purchase from the existing owners would remove lands
  from the tax rolls, whereas leasing would not, the three acquisition options differ
  primarily in terms of their potential effects on the fiscal condition of local government
  jurisdictions in the ROI. Table S-1 summarizes the potential fiscal effects of the three
  acquisition options for local jurisdictions.

Option 1 would result in a combined potential annual revenue loss of approximately \$49,150 in jurisdictions in the ROI due to losses in own source revenues and intergovernmental aid. These jurisdictions include Wood County with a potential annual loss of \$23,850, the town of Port Edwards with a potential annual loss of \$13,512, and the town of Remington with \$5,398, the Pittsville School District with \$5,185, and the Mid-State Technical College District with \$1,205. Lands within the proposed expansion area that fall within the Nekoosa School District are publicly owned or under forestry tax contracts and are not taxed by the school district. Therefore, no direct revenue loss is anticipated.

For Wood County, the largest potential revenue loss would be timber sale revenues on county forest lands, comprising \$16,768 or 70 percent of the county revenue loss. For the two towns, public road aid received from the State of Wisconsin represents the largest potential revenue loss, including \$10,339 or 77 percent of the total for Port Edwards and \$4,253 or 79 percent for Remington. For the Pittsville School District and the Mid-State Technical College District, property tax revenues comprise the entire amount of the potential loss.

If Option 1 were implemented, the potential annual public revenue loss to local jurisdictions would be offset by the following types of fiscal changes: funds paid by the Federal government for purchasing land within the expansion area; reductions in local expenditures for public services in the expansion area, for example road maintenance, fire protection, and law enforcement; payment of property tax penalties, primarily to the towns, on private lands in the expansion area that would be withdrawn from forest tax programs; and increases in state equalization aid for school districts resulting from reductions in the district's tax base.

Option 2, Federal leasing of lands from existing owners, would avoid removing private lands from the local tax base, although lands may be reassessed at lower valuations. The potential combined total revenue loss is \$37,556 per year for local jurisdictions. In Wood County and the two towns, property taxes comprise less than 20 percent of the annual public revenue generated from lands in the expansion area. For all three options considered in this study, it is assumed that County timber sale revenues would be lost, since lands would be withdrawn from the CFL program. If the county retained the timber rights, timber revenues, which comprise the county's largest single source of public revenues from the expansion area, would continue, but the amount may be reduced since it is assumed that lands would be withdrawn from the CFL program, and timber sales would be reduced due to time restrictions on harvests due to training, reduced harvest areas, and lower bids for reduced timber quality. State road aid, which is the largest public revenue source received by towns for the expansion area, would likely be lost due to road closures, regardless of Federal ownership or leasing. In addition, although the Pittsville School District receives public revenues from the expansion area in the form of property taxes, leasing would not significantly change the fiscal effect of the expansion proposal since any loss of school district tax revenues from Federal ownership would be largely offset by increases in state equalization aid.

If Option 2 were implemented, fiscal benefits would include receipt of annual lease payments by the County. Some public services might still be provided by local jurisdictions and costs incurred, depending upon lease terms and agreements with local jurisdictions. Also, state equalization aid for local schools would potentially increase by a smaller amount, since reductions in assessed valuations of private property in the expansion area might occur, but no lands would be removed from the tax rolls.

## Table S-1 COMPARISON OF POTENTIAL FISCAL EFFECTS ON LOCAL JURISDICTIONS IN THE ROI, THREE LAND ACQUISITION OPTIONS FOR THE EXPANSION OF HARDWOOD RANGE

|   | OPTION 1: FEDERAL PURCHASE OF EXPANSION AREA |   | OPTION 2: FEDERAL LEASE FROM EXISTING OWNERS |  | OPTION 3: FEDERAL LEASE FROM STATE |                   |
|---|--|---|--|--|------------------------------------|-------------------|
|   | Annual Revenue<br>Loss                       | Benefit   | Annual Revenue<br>Loss (b)                   | Benefit  | Annual Revenue<br>Loss             | Benefit           |
| Wood County (a)                         | \$23,850                                     | Funds from Federal purchase of CFL Reduced service expenditures \$2,006 tax payments from one-time penalty on land withdrawn from Forest Crop Law contracts                               | \$19,437                                     | Annual lease payments Reduced expenditures for services Funds from one-time tax payments for withdrawn Forest Cropland Tax \$2,006 | Same as Option 1                   | Same as Option 1  |
| Town of Port Edwards                    | \$13,512                                     | Reduced service expenditures One-time penalty of \$3,704 on land withdrawn from Managed Forest Law contracts One-time penalty of \$8,694 on land withdrawn from Forest Crop Law contracts | \$13,248                                     | Same as Option 1   | Same as Option 1                   | Same as Option 1  |
| Town of Remington                       | \$5,398                                      | Reduced service expenditures  | \$4,871                                      | Same as Option 1   | Same as Option 1                   | Same as Option 1  |
| Pittsville School District              | \$5,185                                      | \$5,025 gain in state equalization aid  | 0  | 0  | Same as Option 1                   | Same as Option 1  |
| Nekoosa School District                 | 0  | Negligible change in state equalization aid   | 0  | 0  | Same as Option 1                   | Same as Option 1  |
| Mid-State Technical College<br>District | \$1,205                                      | None  | 0  | 0  | Same as Option 1                   | Same as Option 1  |
| TOTAL (c)                               | \$49,150                                     | As itemized above   | \$37,556                                     | As shown above   | \$49,150                           | As itemized above |

Notes:

- (a) Fiscal effects on Wood County do not include potential indirect effect of County purchasing lands to replace County Forest Land withdrawn due to the range expansion, any related revenue losses from removing private lands from the tax rolls, or related gains in timber sale revenues or intergovernmental aid resulting from new acquisition of County Forest Land.
- (b) Potential annual revenue losses do not account for possible reductions in assessed valuations that may result from military use of private lands leased to the federal government.
- (c) Reduced sales of timber, cranberries, and other crops would create estimated reductions in wages and earnings from agriculture and related activities. These potential losses to the local economy would be in addition to the public revenue losses identified above and would be the same for the three acquisition options.

Option 3, Federal leasing of lands from the State of Wisconsin Department of Military Affairs, assumes that private lands in the expansion area would be removed from the local tax base, and that all county-owned lands would be transferred to the state concurrently with Federal leasing. The potential combined fiscal loss would be \$49,150 per year for local jurisdictions, the same as Option 1. Loss of intergovernmental aid, including road aid and snowmobile trail aid would result from operation of the range once public roads and snowmobile trails are actually closed. If timber rights were retained by the county, it would continue to receive timber sale revenues.

If Option 3 were implemented, receipt of public revenues that may offset losses would mostly result from transferring lands to state ownership rather than as a result of the Federal action of leasing lands from the state. Examples include funds from state purchase or trading of county lands, increases in state equalization aid to the Pittsville School District, and payments to local jurisdictions on lands withdrawn from forest tax programs.

If, as a result of implementation of any of the three acquisition options, Wood County chose to replace 6,162 acres of publicly managed CFL withdrawn as a result of the range expansion, with private land located elsewhere in Wood County, this would result in several types of indirect socioeconomic effects including: removal of replacement lands from the tax rolls; reductions in property tax revenues; and management of replacement lands for multiple use under the CFL program. Depending upon the current use of any replacement lands, public recreation access to lands previously unavailable for such use could occur, however, if replacement lands already allow public recreation access, there could be a net loss of recreation lands. Large blocks of private contiguous, forested lands are not readily available for public acquisition in Wood County. If a substantial percentage of the replacement lands contained idle farmland, reforestation would require additional capital and start-up costs. In addition, in the past, citizens in towns containing possible replacement lands have opposed such efforts because of potential tax base losses. Depending upon the location of replacement lands, which is not currently known, possible displacement of existing residential, agricultural, and other uses could occur, however it is assumed that replacement lands would largely consist of sparsely populated or unoccupied private forest land or cropland mixed with forested land.

#### 1.0 INTRODUCTION

#### 1.1 PURPOSE OF THE STUDY

The purpose of this study is to identify the potential impacts to existing socioeconomic conditions associated with the proposed expansion by 7,137 acres of the Hardwood Air-to-Ground Gunnery Range, located in central Wisconsin. The Volk Field CRTC, which is located at Volk Field ANGB, Wisconsin, operates the existing Hardwood Range in Juneau County. The proposed range expansion area is located in Wood County. Volk Field ANGB contributes over \$25 million annually to the regional economy through payrolls, construction expenditures, purchases of supplies and services, deployed personnel spending, and related secondary expenditures. While most of these purchases take place within the two-county ROI identified for this report (Juneau County and Wood County), with the largest share going to Juneau County, some of these purchases occur by ond the ROI. The proposed range expansion would potentially affect financial conditions and other related socioeconomic conditions in the local area. The range expansion proposal would involve Federal acquisition of land, which would potentially affect financial and related socioeconomic conditions in the local area, the subject of this study. Portions of the socioeconomic information will be incorporated into the EIS for the Hardwood Range Expansion and Related Airspace Actions. The EIS will assess the potential impacts to a wide range of environmental resources associated with expansion of the Hardwood Range in addition to a number of changes in airspace configuration in the vicinity of the range. This document is designed to provide supplementary information to Air Force decisionmakers and assistance to the State of Wisconsin, local governments, and other agencies in assessing and planning for potential socioeconomic effects of the proposal. This document is not required by the NEPA or for other legal compliance. An additional document, Land Use Management Guidelines for the Hardwood Air-to-Ground Gunnery Range will also be completed that will identify land use and resource management guidelines for the operation of the expanded range.

#### 1.2 RANGE EXPANSION OPTIONS

The range expansion options entail expansion of the existing range through acquisition of additional land immediately adjacent to and north of the current range. This additional area encompasses 7,137 acres, hereafter referred to as the expansion area. The additional land is comprised of 6,162 acres currently owned by Wood County and 975 acres that are privately owned. The range expansion would allow the ANG to construct the following facilities: (1) a new area for target locations; (2) a drop zone area (measuring 1,000 by 1,000 yards and located in the northwest section of the expansion area approximately 2 miles north of the existing range boundary) for C-130 transport aircraft to practice combat supply drops; and (3) a short field runway (i.e., tactical assault strip) (measuring 3,500 feet by 60 feet) for C-130 aircraft to practice landing under simulated wartime conditions. Figure 1.2-1 shows the location of the existing range and the proposed expansion area.

The range expansion options vary in the manner in which Federal land for the range expansion is acquired (either through fee purchase or lease) and the entities from whom the land would be acquired (either the existing owners or the State of Wisconsin). These options were

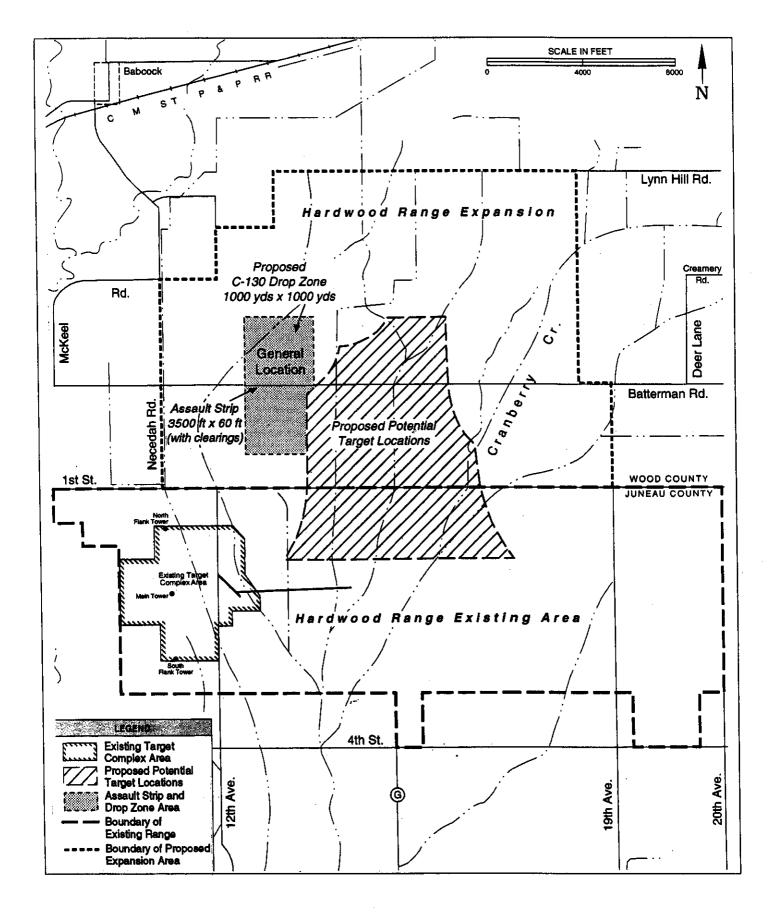


Figure 1.2-1. Configuration of the Hardwood Range Showing Details of Proposed Expansion

developed specifically for use in the Socioeconomic Study since they would differ primarily in their effects on public finances. Descriptions of the three options are provided below.

Option 1: Federal Land Acquisition through Fee Purchase. Under this option, the Federal government would purchase 7,137 acres of land from existing owners (i.e., Wood County and private owners). The Federal government would own the timber rights and the land in the expansion area would be removed from the CFL program.

Option 2: Federal Government Leases Land from Existing Owners — Under this option, the Federal government would lease land from the existing owners. Two approaches would be possible regarding timber rights. Either the Federal government would retain the timber rights or the existing owners would retain these rights. Under either approach, land would be removed from the CFL program, since CFL requires public access for activities such as recreation use, and the range expansion would potentially limit this access.

Option 3: Federal Government Leases Land from the State of Wisconsin — This option assumes a lease arrangement similar to that which occurs on portions of the existing range. The State of Wisconsin Department of Military Affairs would acquire the land from present owners within the range and the Federal government would lease the land from the state. Two approaches would be possible regarding timber rights. Either the Federal government would retain the timber rights or the county would retain the timber rights by agreement with the state. Under either approach, the land would be removed from the CFL program.

#### 2.0 REGION OF INFLUENCE

The ROI for the range expansion proposal is comprised of Wood County and Juneau County and the two towns of Port Edwards and Remington. The EIS will have an expanded ROI because of the environmental impacts related to changes in airspace, which are not part of this study. The proposed expansion area is located entirely within Wood County, is contained within the towns of Port Edwards and Remington, and is immediately adjacent and to the north of the existing range. Insofar as it is the location of the existing range, Juneau County will be addressed under the affected environment section. For the public finance section, the Pittsville and Nekoosa School Districts are also included since they are the school districts that contain portions of the expansion area. See Figure 2-1.

It should be noted that if Wood County elects to replace County Forest Lands in the expansion area with other lands, additional towns and school districts in Wood County could be affected. Since there is no formal proposal by Wood County to replace this land, the locations are not known and the potential secondary economic effects have therefore not been addressed, since they would be speculative. These effects would be the same for the three options.

#### 3.0 AFFECTED ENVIRONMENT

This section presents background information on the existing range as it relates to socioeconomic conditions within Juneau County (e.g., land ownership and land use, forestry, recreation, and public services, such as roads). It then presents a more detailed discussion of existing socioeconomic conditions in the proposed range expansion area for Wood County, and

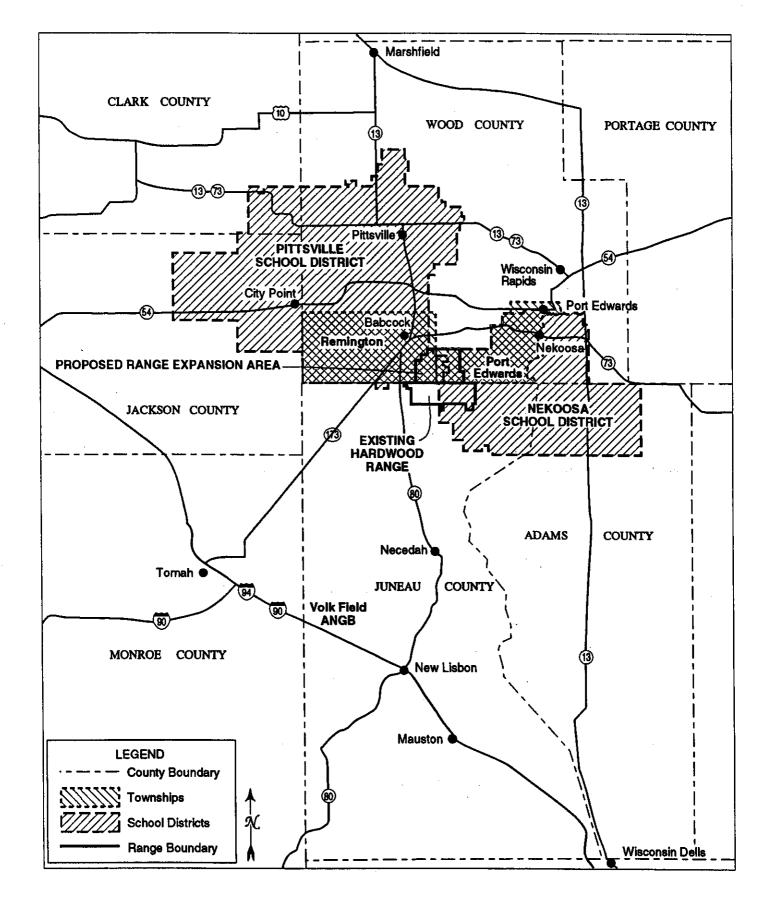


Figure 2-1. Region of Influence

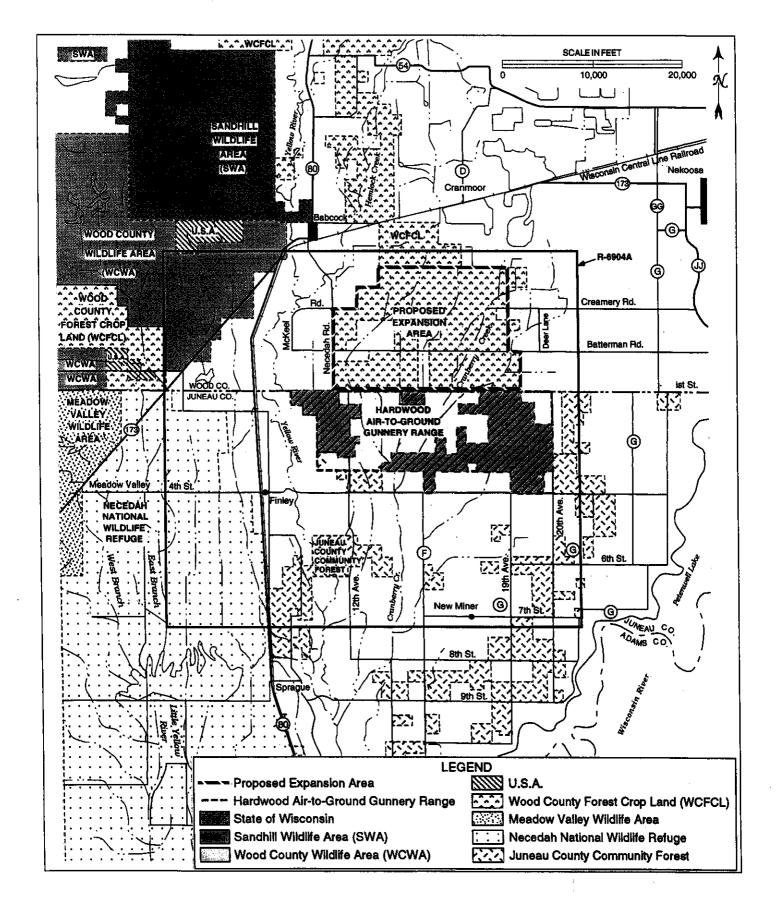


Figure 3.1-1. Land Use and Land Ownership

Board granted an easement extension through 2025. Juneau County withdrew 3,368 acres within the Hardwood Range from the CFL program on February 26, 1997. Juneau County still owns the land, but it is no longer subject to management and access requirements of the CFL program. Removal of land from the County Forest Program does not necessitate its sale or disposal. The withdrawn CFL lands were replaced with other previously owned county lands located in four towns.

Juneau County contains 514,752 acres, including 18,900 acres of water, in 17 towns. Approximately 252,000 acres (51 percent of the land area) are forested. Much of the land in Juneau County is in public ownership, including such areas as the Meadow Valley Wildlife Area (mostly land leased from the Federal government), Cranberry Creek Natural Area (operated by the state), the Necedah National Wildlife Refuge, the Juneau County Forest, the Hardwood Range, Buckhorn State Park, and parts of Mill Bluff and Rocky Arbor State Parks.

#### 3.1.2 Population and Housing

According to the U. S. Census, Juneau County had a population of 23,192 people in 1997, compared to 21,650 people in 1990, a 7.1 percent increase. The county had 8,265 households in 1990 with an average household size of 2.77 persons. About 85 percent of the population is rural. Mauston, the county seat, has a population of 3,609. Other communities include Elroy (1,598), New Lisbon (1,500), and Necedah (826). The population density of Juneau County was 29 persons per square mile in 1990.

There were 11,422 housing units in Juneau County in 1990. An estimated 8,265 of these units were occupied. Of the occupied units, 6,273 were owner-occupied, with the remainder comprising rentals, recreation homes, and other housing classifications. The vacancy rate in Juneau County was 27.6 percent. The vacancy rate reflects a large number of seasonal units, approximately 2,400 units in 1990, which were vacant for most of the year. The median house value in 1990 was \$40,700 and the median rent was \$310 per month.

#### 3.1.3 Economic Activity and Public Finance

The annual economic impact of Volk Field ANGB, located in Juneau County, exceeds \$25 million per year, including more than \$14.7 million in payrolls and expenditures and over \$10 million in secondary economic effects (Volk Field CRTC 1996). In FY 1995 Volk Field ANGB contributed 197 jobs, including 111 military, 80 civilian, and 6 contract employees. Nine of these employees are assigned to Hardwood Range. These jobs constitute approximately 2 percent of total Juneau County employment. Military members reside in Monroe, Juneau, Wood, Sauk, Jackson, Lacrosse, and Adams counties. Approximately 10 employees lived in Wood County. Volk Field ANGB payrolls totaled approximately \$8.5 million in Fiscal Year (FY) 1995 and annual procurements and deployed personnel spending totaled \$6.2 million. Approximately \$10.2 million or 40 percent of construction contracts issued by Volk Field from 1990 to 1995 went to contractors in Wood County. Since 1993, two contracts, totaling \$800,000 have been awarded to Wood County contractors. A 1992 contract for \$7.8 million was for runway construction of which approximately 75 to 80 percent was for ready mix materials.

#### Volk Field Air National Guard Base Employment, Payrolls, and Expenditures (FY 1995)

|                             | Employees   | <b>Payrolls</b> |
|-----------------------------|-------------|-----------------|
| Military                    | <del></del> | <del></del>     |
| Volk CRTC                   | 86          | \$4,442,655     |
| 128 ACS                     | <b>2</b> 5  | 1,066,100       |
| Civilian – Volk CRTC        | 80          | 2,773,600       |
| ACMI Contract               | 6           | 200,000         |
| Total                       | 197         | \$8,482,355     |
| Purchases                   | Expe        | enditures       |
| Supplies and Services       | \$1         | 1,170,218       |
| Ground Fuel                 |             | 74,000          |
| Deployed Personnel Spending | 1           | 1,300,000       |
| Construction                | 3           | 3,700,000       |
| Total                       | · \$6       | 5,244,218       |
| C V-11, Et-14 CDTC 1007     |             |                 |

Source: Volk Field CRTC 1996.

Employment in Juneau County, as a whole, totaled 11,637 jobs in 1992, with the largest numbers of jobs in manufacturing (25.6 percent), followed by services (17.1 percent), retail trade (16.5 percent), and government (14.8 percent). There were 1,180 jobs in agriculture, forestry, and fisheries (10.1 percent). The average unemployment rate during 1991 was 6.7 percent in Juneau County, compared to the State unemployment rate of 5.2 percent (U.S. Census 1994). Average annual earnings per job amounted to \$19,028 in Juneau County in 1993 (U.S. Bureau of Economic Analysis [BEA] 1994). According to the 1990 Census, median household income in the county was \$22,073. Earnings by persons employed in Juneau County equaled \$240.7 million in 1994.

#### 3.1.4 Public Finance

From 1992 through 1996, aggregate Juneau County revenues from CFL timber sales, County forest administrator's grants, and payments in lieu of taxes on CFL totaled \$608,867 countywide, averaging \$121,773 per year. On the existing range, the sold value of timber over this period was \$63,166 on the County Forest and \$157,396 on the state-owned lands.

In FY 1996, Juneau County's revenues were \$14,364,299 and expenditures were \$13,839,079. Intergovernmental grants and aid comprised the largest revenue category, totaling \$6,465,094 or 45.0 percent. This is followed by taxes, which comprise \$2,218,990 or 34.5 percent of total county revenues. The largest expenditure categories include health and human services, totaling \$6,010,707 or 43.4 percent, followed by public safety, totaling \$4,952,175 or 16.0 percent (Juneau County 1997).

#### 3.1.5 Public Services

Since the proposed range expansion would take place in Wood County, there would be no direct impact to public services in Juneau County, the location of the existing range. The information below briefly describes public services, including roads, utilities, and fire protection that are used by the existing range. Off-site services are not discussed.

Roads within the existing range consist of those operated and maintained by towns, roads built and gated by the range, and temporary logging access roads installed by logging firms. Utilities such as water and waste water are provided by the range itself, through well and septic systems. Demand is minimal given the single, small building complex which contains several offices occupied by range operations personnel. Nine personnel are currently assigned to the range.

Fire protection within the Hardwood Range boundaries is the responsibility of the range. Fire fighting support agreements exist with the State of Wisconsin and town of Remington. Normally, the range responds to all fires within its boundaries and the State of Wisconsin suppresses fires outside of the range within the state forests. The agreement with the state provides for joint fire fighting responsibilities and identifies conditions and types of assistance. Under ANG's agreement with the town of Remington, each entity agrees to lend assistance to the other when needed and possible. Normally no cost would be billed to the other party, although any prolonged assistance may require reimbursement calculated at the time. The range also has a support agreement with a private landowner which provides for this owner to maintain the fire break along a portion of the south boundary of the range which borders his property. The support agreement provides the private land owner with easements on ditches located within the range which he then maintains and uses to supply water to cranberry bogs operated on his contiguous property, and allows the range to utilize certain private roads near its property for firefighting purposes. Juneau County also maintains fire breaks within the range by conducting timber cutting in specified areas.

#### 3.1.6 Forestry

Juneau County holds the timber rights to the entire existing range including the area owned by the state, and contracts out timber cutting within this area. Because of leasing arrangements, the Federal government does not currently receive revenues from the forestry program on the Hardwood Range. Juneau County owns 3,650 acres of land within the existing range. Access for timber cutting is coordinated with the range and restrictions are placed upon cutting times. Within the target area and approximately one-half mile, timber may contain shells from strafing, and prices paid by mills are reduced. Prices of timber within the range but outside these areas are not affected (personal communication, D. Dorow 1997). The most common timber type on the county land in the existing range is aspen (42 percent), followed by jack pine (29 percent), and pin oak (12 percent). Approximately 10 percent of the county land on the range is marsh and non-productive.

#### 3.1.7 Recreation

Limited access for recreation purposes is allowed on the existing range. The Integrated Land Use Management Plan (ILUMP) (T.N. & Associates, Inc. 1994) provides information and recommendations for integrating management of the Volk Field ANGB and Hardwood Range natural and cultural resources with maintenance of the primary mission: the preparation and training of military units. It includes recommendations for natural resource interpretation and recreation.

Recreation activities on the range include deer, turkey, and grouse hunting and wildlife viewing. In addition, on many weekends, as many as 150 people come to the range to watch planes from the viewing area. An open house is held at the range every two years, attended by

approximately 2,000 people. Except for the nine-day gun deer season in November, anyone who wishes to use Hardwood Range for any recreational reason must check in at the range building complex. A 24-hour per day phone recording provides flight schedule information to visitors. Recreational use is restricted based upon flight schedules and some areas are restricted from public use to ensure security and public safety. Recreation use is prohibited on the range during operating hours from 9 A.M. to 4 P.M. Monday through Saturday, except for the eastern end of the range (between 19th and 20th avenues) which remains open. Approximately 15 percent of the range is therefore generally available for recreation (the eastern end) and another 15 percent (the target complex) is closed except for viewing of flights. The remainder is open for recreation during non-operating hours.

During the nine-day gun deer hunting season, the peak hunting period, flying activities at the range continue but aircraft are restricted from dropping any ordnance and will not fly below 5,000 feet. During this time, the range is open for hunting except for the marked No Hunt Area, which contains unexploded practice ordnance. Motor vehicle access and parking on range property are limited to designated areas.

Federal and state recreation areas in the vicinity of the range include Necedah National Wildlife Refuge and Meadow Valley Wildlife Area. Buckhorn State Park, 11 miles north of Mauston, and Mill Bluff State Park, on the border with Monroe County, are also located in Juneau County.

Necedah National Wildlife Refuge contains 41,720 acres and is owned and managed by the U.S. Fish and Wildlife Service. The primary purpose of the refuge is to provide sanctuary for migratory waterfowl and other wildlife. Recreational activities include observation tours, auto tour road, wildlife and bird watching, hiking, camping, fishing, hunting and winter sports such as cross-country skiing.

Meadow Valley Wildlife Area contains 57,546 acres. The area provides opportunities for hunting, camping, berry picking, walking, snowmobiling on two trails, wildlife viewing, and other recreation activities. In 1990, there were 88,000 participant days of hunting and trapping, 20,000 participant days of camping, 3,000 participant days of snowmobiling, and 3,000 participant days of fishing days reported (personal communication, M. Zeckmeister 1995). A participant day is defined as participation by one individual in a form of recreational activity during some portion of the day.

#### 3.1.8 Agriculture

According to the U.S. Census, there were 675 farms in Juneau County in 1992 with a total acreage of 195,287, or an average of 289 acres per farm. Harvested cropland comprised 103,139 acres on 622 of these farms. The average market value of land and buildings was \$240,626 per farm, an average of \$819 per acre. The market value of products sold was \$55,708,000 or \$82,530 per farm. Net cash return from sales was \$10,982,000. Seven farms harvested cranberries on a total of 932 acres producing 115,398 cwt (hundred weight). Hired farm labor was 825 workers. The majority of these workers worked fewer than 150 days as either part-time or migratory workers (U.S. Census 1994).

### 3.2 AFFECTED ENVIRONMENT OF THE PROPOSED RANGE EXPANSION AREA

#### 3.2.1 Land Ownership and Land Use

Wood County contains 517,760 acres of land (809 square miles) and 22 towns. Of this acreage, 206,500 or 40 percent are classified as forested land. Wood County contained 221,357 acres of land within farms in 1992 and approximately 3,065 acres of cranberries were harvested on 40 farms in that same year (U.S. Census 1994). The Wisconsin State Cranberry Growers Association reports that there are currently 4,031 planted acres (personal communication, T. Lochner 1997).

Large portions of Wood County are under public ownership and management. County-wide, there are 37,536 acres of Wood CFL owned by the county and managed for multiple use. In addition, state and county recreation and wildlife areas and parks are located within Wood County near the expansion area. These include Sandhill Wildlife Area, Wood County Wildlife Area, and Dexter Park, which is operated by Wood County (see Figure 3.1-1). Forestry and recreation are discussed further in Sections 3.2.6 and 3.2.7, respectively.

The proposed 7,137 acre expansion area comprises 1.4 percent of the area within Wood County. The expansion area includes 6,162 acres owned by Wood County and 975 acres that are privately owned. The acreage owned by Wood County is in the CFL program and comprises 16.4 percent of the Wood CFL. Existing development within the proposed expansion area is limited mostly to the western portion in the vicinity of Batterman Road and Range Line Road. There are seven year-round residences in the expansion area: three single family site-built residences and four mobile homes. There are also six seasonal residences in the expansion area including two single family homes and four mobile homes. One owner currently operates a cranberry bog and row crops are also grown in the area. Agriculture is discussed further in Section 3.2.8.

Approximately 316 acres of private lands within the expansion area are currently subject to Woodland Tax Law, Forest Crop Law, or Managed Forest Law contracts (Wisconsin Statute 77 et seq.), referred to as forest tax contracts. These contracts are designed to encourage growing and harvesting of wood crops according to sound forest management practices and plans. They provide reductions in annual taxes until contracts are terminated. The Forest Crop program, under which approximately 80 acres are contracted, requires the landowner to open their land to the public for hunting and fishing. The Woodland Tax Law program does not require public recreation access. Under the Managed Forest Law program, areas my be designated either open or closed. If lands are withdrawn from the tax programs, landowners are subject to a penalty or payment of taxes to offset the prior tax savings received.

#### 3.2.2 Population and Housing

Wood County had 77,215 residents in 1997. There are four cities in the county. The two largest are Marshfield, located in the northwestern part of the county, and Wisconsin Rapids, the county seat, located in the southeastern part of the county. The other two cities are Nekoosa and Pittsville. In addition, there are eight villages.

Wood County represents a mix of urban and rural populations, with an overall average population density of 94 persons per square mile. The 1990 census established the Wood County population as 73,605 persons, an increase of less than 2 percent from the 1980 population of 72,799 (see Table 3.2-1). From 1990 to 1997 there was an approximate increase in population of 5 percent.

| <b>Table 3.2-1</b>                  |
|-------------------------------------|
| <b>Town and County Demographics</b> |

| 1997 Population             | Remington<br>323 | Port Edwards<br>1,420 | Wood County<br>77,215 |
|-----------------------------|------------------|-----------------------|-----------------------|
| 1992 Population             | -                | -                     | 74,729                |
| 1990 Population             | 305              | 1,351                 | 73,605                |
| 1980 Population             | -                | -                     | 72,799                |
| 1990 Households             | 110              | 460                   | 27,473                |
| 1990 Average Household Size | 2.77             | 2.94                  | 2.65                  |

Note

a. Remington and Port Edwards data are also included in Wood County totals.

U.S. Census 1982, 1992, 1994; Wisconsin Bureau of Intergovernmental Relations 1997. Source:

This level of population growth was significantly less than the total U.S. population growth of 10 percent for the same period, and also fell short of the state-level population growth of 4 percent. By 1992, population in Wood County had grown to 74,729 persons, a 1.5 percent increase since 1990. According to the 1990 Census, there were 27,473 households in Wood County, with an average household size of 2.65 persons.

In 1997, the population of the town of Port Edwards was 1,420 and the population of Remington was 323, compared to populations of 1,351 and 305 persons, respectively, in 1990. There were 460 households in Port Edwards, with an average household size of 2.94 persons, and 110 households in Remington, with an average household size of 2.77 persons.

According to the 1990 Census, there were 28,829 housing units in Wood County (see Table 3.2-2).

#### **Table 3.2-2** Town and County Housing (1990)

|                                  | Remington | Port Edwards | Wood County |
|----------------------------------|-----------|--------------|-------------|
| Total Housing Units <sup>b</sup> | 200       | 505          | 28,829      |
| Occupied Units                   | 120       | 460          | 27,473      |
| Owner-Occupied                   | 42        | 404          | 20,138      |
| Vacancy Rate                     | 40.0%     | 3.4%         | 4.7%        |
| Median Value                     | _         | _            | \$50,500    |
| Median Rent                      | \$331     | \$224        | \$343       |

Notes:

U.S. Census 1992, 1994. Source:

a. Remington and Port Edwards data are also included in Wood County totals.

Includes housing units such as recreational homes, migrant worker quarters, and other not designated either owner-occupied or rental units.

An estimated 27,473 of these units were occupied. Of the occupied units, approximately 73.3 percent were owner-occupied and the remaining 26.7 percent comprised rentals, recreation homes, and other housing classifications. The overall vacancy rate in Wood County was 4.7 percent in 1990. The median value of housing units in 1990 was \$50,500 in Wood County, compared to the state median home value of \$62,500. Median rent in Wood County was \$343 per month. The vacancy rate in Remington is higher than Port Edwards primarily due to the larger portion of seasonal units, most of which were used for hunting (personal communication, D. Lawrence 1995).

#### 3.2.3 Economic Activity

The economy of Wood County is supported by a combination of manufacturing, services, and retail employment. In 1994, employment in the services industry accounted for 15,642 jobs, representing 30.4 percent of the total 51,532 workers employed in the county that year (see Table 3.2-3). Manufacturing industries employed 10,772 workers, or roughly 20.9 percent of the county total. Retail trade accounted for 9,215 jobs, 17.9 percent of total county employment. Agriculture, forestry, and fisheries accounted for 1,971 jobs, together representing 3.8 percent of county workers.

|                | Table 3.2- | -3               |       |
|----------------|------------|------------------|-------|
| Wood County Em | ployment   | t by Industry, 1 | 994 • |

| <u>Industry</u>                       | <b>Employment</b> |
|---------------------------------------|-------------------|
| Agriculture, Forestry and Fisheries b | 1,971             |
| Mining                                | 25                |
| Construction                          | 2,318             |
| Manufacturing                         | 10,772            |
| Transportation and Public Utilities   | 3,416             |
| Wholesale Trade                       | 1,633             |
| Retail Trade                          | 9,215             |
| Finance, Insurance and Real Estate    | 1,792             |
| Services                              | 15,642            |
| Government                            | 4,748             |
| TOTAL                                 | 51,532            |

Note:

- Employment is reported by place of work and does not necessarily coincide with the number of workers residing in a specific county.
- b. Agricultural employment as presented in this table may not be consistent with farm labor reported by the U.S. Census due to differences in statistical technique.

Source: U.S. BEA 1995.

The overall contribution of forestry to the economy of the county, however, is not clearly represented by these industry-specific employment figures. Significant portions of other industry sectors, such as manufacturing (which includes paper and lumber products) and transportation (which includes forest product trucking and warehousing), are dependent upon timber production. Therefore, the economic activity in these industries is generated by activity in the forestry industry. It is estimated that close to 30 percent of all jobs in the region are either directly or indirectly related to forestry and timber production (U.S. BEA 1994).

The total number of jobs in Wood County in 1980 was 39,361, increasing to 51,532 jobs in 1994, and representing an increase of about 31 percent during the 15 year period (U.S. BEA 1996). The services industry accounted for the largest share of job growth during this period.

Unemployment rates experienced in Wood County are slightly higher than state unemployment levels. The average unemployment rate during 1991 was 6.0 percent in Wood County, compared to the state level unemployment rate of 5.2 percent (U.S. Census 1994).

Earnings in Wood County totaled approximately \$1.4 billion in 1994. The distribution of earnings across industries is essentially the same as the distribution of employment, with services, manufacturing, and retail trade representing the largest income producers (U.S. BEA 1996). In 1994, Wood County had a per capita personal income of \$21,299 which was 102 percent of the state-wide average and 98.2 percent of the national average.

#### 3.2.4 Public Finance

This section describes revenues and expenditures for Wood County, the towns of Port Edwards and Remington and the Pittsville and Nekoosa school districts. Data for fiscal years 1994 through 1996 are presented for historical background. The most recent data, FY 1996, is discussed. Discussions of individual revenue types and amounts attributable to property located within the expansion area (e.g., from county forest revenues, payments in lieu of taxes, road aid, and school aid) are presented in Section 4.0 Socioeconomic Effects of the Three Land Acquisition Options.

#### Wood County

Services provided by Wood County are funded principally through the county's general fund, which contributed approximately 95 percent of revenues generated by all types of funds in FY 1996. In FY 1996, revenues and expenditures of the general fund were \$26,918,507 and \$26,957,042 respectively (Table 3.2-4).

Principal revenue sources are intergovernmental transfers (56.5 percent of total FY 1996 general fund revenue collections) and property taxes (25.9 percent of total FY 1996 collections). Principal expenditures are for health and social services (44.9 percent of total FY 1996 expenditures), public safety (18.6 percent of total FY 1996 expenditures), and conservation and development (13.9 percent of total FY 1996 expenditures). The fund balance at the end of FY 1996 was \$12,839,882. The assessed valuation in Wood County was \$2,644,117,600 in 1997. General obligation indebtedness is \$4.7 million.

#### Town of Port Edwards

In FY 1996, estimated revenues and expenditures of Port Edwards were each \$184,983. The principal revenue sources are intergovernmental revenues, primarily from state shared revenues and state highway aid (75.3 percent of total FY 1996 revenue collections), and property taxes (11.6 percent of the total FY 1996 revenue collections) (see Table 3.2-5). Principal expenditures are for public works (63.7 percent of total FY 1996 expenditures), general government (22.9 percent of total FY 1996 expenditures), and public safety (12.8 percent of total FY 1996 expenditures). Assessed valuation in Port Edwards is approxi-mately \$32,932,750.

#### Town of Remington

In FY 1996, revenues and expenditures of Remington were \$390,566 and \$395,340, respectively (Table 3.2-6). Excluding \$200,871 of revenues that are collected by the town and passed through to either the state, county, or local school district, the principal revenue source for

Table 3.2-4 Wood County: General Fund Revenues, Expenditures and Fund Balances, FY 1994-1996

|  | <u>1994</u>         | <u> 1995</u>    | <u>1996</u>     |
|--|---------------------|-----------------|-----------------|
| Revenues Taxes   | E (01.07/           |                 | (0(/415         |
| Intergovernmental Revenues   | 5,691,376           | 6,353,299       | 6,966,417       |
| <u> </u>   | 13,660,474          | 14,678,012      | 15,211,942      |
| Public Charge for Services   | 2,956,339           | 3,006,151       | 2,960,806       |
| Regulation and Compliance  | 193,275             | 240,191         | 218,323         |
| Intergovernmental Charge for Services  | 453,031             | 688,729         | 611,588         |
| Interest Income  | 554,895             | 758,926         | 910,533         |
| Miscellaneous  | 58,632              | 30,483          | 38,898          |
| Total Revenues   | 23,568,022          | 25,755,791      | 26,918,507      |
| Expenditures   | 20,000,022          | 20,700,71       | 20,710,007      |
| Current:   |                     | •               | •               |
| General Government   | 2,997,961           | 3.010.144       | 3,368,548       |
| Public Safety  | 4,672,724           | 4.747.571       | 5,020,504       |
| Health & Social Services   | 11,468,755          | 11.726.548      | 12,117,269      |
| Leisure Activities & Education   | •                   | 1.838.469       |                 |
| Conservation & Development   | 1,648,823           |                 | 1,609,087       |
| Capital Outlay   | 3,428,063           | 3,919,179       | 3,753,217       |
| Debt Service   | 438,808             | 594,902         | 1,088,417       |
| Principal Retirement   |                     |                 |                 |
|  | <b></b> '           | _               | -               |
| Interest and Fiscal Charges  | _                   |                 | _               |
| Total Expenditures   | 24,655,134          | 25,634,813      | 26,957,042      |
| Fund Balance (December 31) =   | 10,654,130          | 12,028,849      | 12,839,882      |
| Note: a. Includes interfund transfers to and find balances may not total.  Source: Wood County 1994, 1995, 1996. | rom funds other tha | n those shown h | ere; thus, fund |

| <b>Table 3.2-5</b>                                |
|---|
| Town of Port Edwards                              |
| Estimated Revenues and Expenditures, FY 1994-1996 |

| Revenues   145,621.50   144,852.00   139,308.00   Licenses and Permits   1,860.00   1,860.00   1,850.00   Public Charges for Services   - 3,250.00   3,225.00   General Miscellaneous   4,650.00   21,650.00   19,200.00   Town Tax Levy   21,400.00   21,400.00   21,400.00   21,400.00   Total Revenues   173,531.50   193,012.00   184,983.00   Expenditures   General Government   44,600.00   43,000.00   42,400,000   Public Safety   20,864.00   20,950.00   23,750.00   Public Works   107,667.50   128,562.00   117,933.00   Culture & Recreation/Miscellaneous   400.00   500.00   1,000.00   Total Expenditures   173,531.50   193,012.00   184,983.00   184,983.00   Total Expenditures   173,531.50   193,012.00   184,983.00   184,983.00   Total Expenditures   173,531.50   193,012.00   184,983.00 |                                    | <u>1994</u>         | <u> 1995</u> | <u> 1996</u> |
|--|------------------------------------|---------------------|--------------|--------------|
| Licenses and Permits       1,860.00       1,860.00       1,850.00         Public Charges for Services       —       3,250.00       3,225.00         General Miscellaneous       4,650.00       21,650.00       19,200.00         Town Tax Levy       21,400.00       21,400.00       21,400.00         Total Revenues       173,531.50       193,012.00       184,983.00         Expenditures         General Government       44,600.00       43,000.00       42,400,000         Public Safety       20,864.00       20,950.00       23,750.00         Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00  | Revenues                           |                     |              |              |
| Public Charges for Services       —       3,250.00       3,225.00         General Miscellaneous       4,650.00       21,650.00       19,200.00         Town Tax Levy       21,400.00       21,400.00       21,400.00         Total Revenues       173,531.50       193,012.00       184,983.00         Expenditures         General Government       44,600.00       43,000.00       42,400,000         Public Safety       20,864.00       20,950.00       23,750.00         Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00  | Intergovernmental Revenues         | 145,621.50          | 144,852.00   | 139,308.00   |
| General Miscellaneous       4,650.00       21,650.00       19,200.00         Town Tax Levy       21,400.00       21,400.00       21,400.00         Total Revenues       173,531.50       193,012.00       184,983.00         Expenditures       Seneral Government       44,600.00       43,000.00       42,400,000         Public Safety       20,864.00       20,950.00       23,750.00         Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00  |                                    | 1,860.00            | 1,860.00     | 1,850.00     |
| Town Tax Levy       21,400.00       21,400.00       21,400.00         Total Revenues       173,531.50       193,012.00       184,983.00         Expenditures       Seneral Government       44,600.00       43,000.00       42,400,000         Public Safety       20,864.00       20,950.00       23,750.00         Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00   | Public Charges for Services        | · . <del>-</del>    | 3,250.00     | 3,225.00     |
| Total Revenues         173,531.50         193,012.00         184,983.00           Expenditures         General Government         44,600.00         43,000.00         42,400,000           Public Safety         20,864.00         20,950.00         23,750.00           Public Works         107,667.50         128,562.00         117,933.00           Culture & Recreation/Miscellaneous         400.00         500.00         1,000.00   | General Miscellaneous              | 4,650.00            | 21,650.00    | 19,200.00    |
| Expenditures       44,600.00       43,000.00       42,400,000         Public Safety       20,864.00       20,950.00       23,750.00         Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00  |                                    | 21,400.00           | 21,400.00    | 21,400.00    |
| General Government       44,600.00       43,000.00       42,400,000         Public Safety       20,864.00       20,950.00       23,750.00         Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00  | Total Revenues                     | 1 <i>7</i> 3,531.50 | 193,012.00   | 184,983.00   |
| General Government       44,600.00       43,000.00       42,400,000         Public Safety       20,864.00       20,950.00       23,750.00         Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00  | Expenditures                       |                     |              |              |
| Public Safety       20,864.00       20,950.00       23,750.00         Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00  |                                    | 44,600.00           | 43.000.00    | 42,400,000   |
| Public Works       107,667.50       128,562.00       117,933.00         Culture & Recreation/Miscellaneous       400.00       500.00       1,000.00  | Public Safety                      | 20,864.00           |              |              |
| Culture & Recreation/Miscellaneous 400.00 500.00 1,000.00  | Public Works                       | 107.667.50          | 128.562.00   |              |
|  | Culture & Recreation/Miscellaneous | 400.00              | 500.00       |              |
| 175,551,50 175,612.00 104,765.00   | Total Expenditures                 | 173,531.50          | 193,012.00   | 184,983.00   |
| Source: Town of Port Edwards 1997.   | Source: Town of Port Edwards 1997. | *                   |              |              |

Remington is intergovernmental transfers, primarily state grants for highway aid and state shared revenues (54.8 percent of total FY 1996 revenue collections), followed by property taxes levied by the town (approximately 16.8 percent of FY 1996 revenue collections). Principal expenditures, excluding pass throughs from total expenditures, are for public works (76.9 percent of FY 1996 expenditures), general government (12.5 percent of FY 1996 expenditures), and public safety (4.3 percent of FY 1996 expenditures). Assessed valuation in Remington is approximately \$14,006,800.

#### Pittsville School District

The Pittsville School District serves areas within four counties: Wood, Juneau, Jackson, and Clark, including a portion of the range expansion area. Enrollment for the 1996/97 school year is 828 students in K-12 classes, compared to an enrollment of 824 in 1990/91.

Services provided by the Pittsville School District are funded principally through the district's general fund, which contributed approximately 90 percent of revenues generated by all types of funds in FY 1996 (Table 3.2-7). In that period, revenues and expenditures of the general fund were \$4,793,738 and \$4,819,187, respectively. The fund balance was \$614,528, or 12.8 percent of operating expenditures. Principal revenue sources are state aid (66.3 percent of total FY 1996 general fund revenue collections) and local property taxes (30.8 percent of total FY 1996 collections). Principal expenditures are for instruction (60.0 percent of total FY 1996 expenditures) and support services (40.0 percent of total FY 1996 expenditures). The equalized valuation of the district is \$123,163,714. Total general obligation debt was \$1,678,724 as of June 30, 1994.

| Table 3.2-6                               |  |  |  |
|---|--|--|--|
| Town of Remington                         |  |  |  |
| Revenues, Expenditures, and Fund Balances |  |  |  |
| FY 1994-1996                              |  |  |  |

|   | <u>1994</u>        | <u> 1995</u> | <u>1996</u>        |
|---|--------------------|--------------|--------------------|
| Revenues                                    |                    | •            |                    |
| Taxes Collected                             | 212,403.99         | 224,206.12   | 232,501.15         |
| Intergovernmental Revenues                  | 100,481.27         | 105,778.51   | 103,497.58         |
| Licenses and Permits                        | <i>7</i> 10.01     | 713.30       | 643.01             |
| Miscellaneous Revenue                       | 53 <b>,423</b> .61 | 4,370.44     | 53 <i>,</i> 759.70 |
| Public Charges for Services                 | 380.00             | 305.00       | 165.00             |
| Total Revenues                              | 367,398 <b>.88</b> | 335,373,37   | 390,566.44         |
| Expenditures                                |                    |              |                    |
| General Government                          | 26,343.25          | 25,625.34    | 24.246.73          |
| Public Safety                               | 4,845.83           | 6,117.81     | 8.261.26           |
| Public Works                                | 143,342.95         | 116,344.37   | 149,554.85         |
| Health & Human Services                     | 4,096.07           | 2,801.99     | 11,014.83          |
| Debt Services                               | 1,391.05           | 1,391.05     | 1,391.05           |
| School District Payments                    | 119,493.95         | 125,227.59   | 130,806.69         |
| State and County Taxes                      | 64,272.32          | 67,345.93    | 70,064.10          |
| Total Expenditures                          | 363,785.42         | 344,854.08   | 395,339.51         |
| FUND BALANCE (DECEMBER 31)                  | 61,904.20          | 52,423.49    | 47,650.42          |
| Source: Town of Remington 1995, 1996, 1997. |                    |              | -                  |
|   |                    |              |                    |

## Table 3.2-7 School District of Pittsville General Fund Revenues, Expenditures, and Fund Balances FY 1994-1996

|  | <u>1994</u> | <u>1995</u> | <u> 1996</u> |
|--|-------------|-------------|--------------|
| Revenues   |             |             |              |
| Local Sources  | 1,464,921   | 1,389,336   | 1,475,472    |
| Other School Districts within Wisconsin  | 11,446      | 21,392      | 23.795       |
| Intermediate Sources   | 9,372       | 14,538      | 12,262       |
| State Sources  | 2,647,585   | 2,939,237   | 3,180,259    |
| Federal Sources  | 72,492      | 74,653      | 95,747       |
| Other Revenues   | 16,065      | 12,702      | 6,203        |
| Total Revenues   | 4,221,881   | 4,451,858   | 4,793,738    |
| Expenditures   |             | • •         |              |
| Instruction  | 2,739,934   | 2,793,908   | 2,890,977    |
| Support Services   | 1,500,968   | 1.705.009   | 1,928,209    |
| Non-Program Transactions   | 62          | -0-         | -0-          |
| Total Expenditures   | 4,240,964   | 4,498,917   | 4,819,187    |
| Fund Balance (June 30) •   | 677,035     | 639,976     | 614,528      |
| Note: a. Includes interfund transfers to and from funds other than those shown here; thus, fund balances may not |             |             |              |

voie:

a. Includes interfund transfers to and from funds other than those shown here; thus, fund balances may no total.

Source: School District of Pittsville 1995, 1996, 1997.

#### Nekoosa School District

The Nekoosa School District serves areas within Wood, Juneau, and Adams counties, including a portion of the range expansion area. Enrollment for the 1996/97 school year was 1,538 students in K-12 classes, compared to an enrollment of 1,478 in 1990/91.

Services provided by the Nekoosa School District are funded principally through the district's general fund, which contributed approximately 76 percent of revenues generated by all types of funds in FY 1996 (Table 3.2-8). In that period, revenues and expenditures of the general fund were \$8,615,696 and \$8,770,833, respectively. The fund balance was \$2,064,991, or 23.5 percent of operating expenditures. Principal revenue sources are local property taxes (52.0 percent of total FY 1996 general fund revenue collections) and state aid (46.1 percent of total FY 1996 collections). Principal expenditures are for instruction (62.6 percent of total FY 1996 expenditures) and support services (37.4 percent of total FY 1996 expenditures). The equalized valuation for 1996/97 was \$390,074,392.

#### Mid-State Technical College District

The Mid-State Technical College District is one of 15 vocational technical school districts in the State of Wisconsin. Its facilities serve eight counties, including Wood County and Juneau County. Services provided by the district are funded primarily by property taxes.

## Table 3.2-8 School District of Nekoosa General Fund Revenues, Expenditures, and Fund Balances FY 1994-1996

|  | <u>1994</u>        | <u> 1995</u> | <u>1996</u> |  |  |
|--|--------------------|--------------|-------------|--|--|
| Revenues   |                    |              |             |  |  |
| Local  | 5,154,581          | 4,756,045    | 4,477,264   |  |  |
| Interdistrict  | 26,383             | 15,128       | 4,567       |  |  |
| Intermediate   | 4,227              | 17,735       | 13,340      |  |  |
| State  | 2,565,272          | 3,238,624    | 3,972,304   |  |  |
| Federal  | 137,546            | 146,707      | 148,060     |  |  |
| Other  | 20 <i>,77</i> 3    | 8,908        | 161         |  |  |
| Total Revenues   | 7,908, <b>7</b> 82 | 8,183,147    | 8,615,696   |  |  |
| Expenditures   |                    |              |             |  |  |
| Instruction:   |                    |              |             |  |  |
| Current  | 5,146,840          | 5,372,463    | 5,457,476   |  |  |
| Capital Outlay   | · · · -            | 22,797       | 31,084      |  |  |
| Support Service:   |                    |              |             |  |  |
| Current  | 3,310,526          | 3,042,886    | 3,168,477   |  |  |
| Capital Outlay   | _                  | 57,831       | 41,531      |  |  |
| Debt Service   | -                  | 88,567       | 67,321      |  |  |
| Community Service:   |                    |              |             |  |  |
| Current  | _                  | -            | _           |  |  |
| Capital Outlay   |                    | <del></del>  | _           |  |  |
| Non-Program — Current  | 5,124              | 4,093        | 4,944       |  |  |
| Total Expenditures   | 8,462,490          | 8,588,637    | 8,770,833   |  |  |
| FUND BALANCE -   | 1,909,133          | 1,916,525    | 2,064,991   |  |  |
| Note: a. Includes interfund transfers to and from funds other than those shown here; thus, fund balances may not |                    |              |             |  |  |
| total.   |                    | •            |             |  |  |
| Source: School District of Nekoosa 1996.   |                    |              |             |  |  |

#### 3.2.5 Public Services

Public services within the expansion area are generally provided by Wood County, and either Port Edwards or Remington. Because the expansion area is located in a sparsely populated rural area, services such as water and waste water are provided by individual well and septic systems which are permitted by the county. Law enforcement is primarily the responsibility of Wood County, although the towns have a local constable. Fire protection within Port Edwards is contracted through the City of Nekoosa. Remington has a volunteer fire department with a fire station in Babcock. The Wisconsin Department of Natural Resources, through its designated forester located in Wood County, maintains a system of communications, equipment, and personnel who suppress forest fires on CFL, state lands, and private lands outside municipalities. Ambulance services in Remington are provided by the City of Pittsville. Road and bridge maintenance and snow removal are primarily provided by the towns.

#### 3.2.6 Forestry

Statewide, the county forest system contains 2,313,000 acres enrolled in the CFL program. Over the past ten years Wisconsin counties have entered approximately 1,900 acres annually under the county forest law for a total program acreage increase of 19,324. The Department of Natural Resources has handled 8 to 12 withdrawal requests per year, however the acreage in the program continues to grow (Wisconsin Department of Natural Resources [DNR] 1995b).

Wood County's 37,536 acres of CFL represents 1.62 percent of the CFL land state-wide. The Wood County Forest is actively managed for multiple use to maintain an ecologically

sustainable program including the production of timber and wildlife along with the maintenance of water quality and public recreation.

The range expansion area contains 6,162 acres or 16.4 percent of the existing Wood CFL. Merchantable timber in the proposed Hardwood Range expansion area consists primarily of aspen, oak, and pines (red, white, and jack). There are approximately 3,838 acres merchantable timber present comprising over 44,967 cords and almost 2.9 million board feet, with a value of \$1,202,787 (see Appendix Table A-1). There are approximately 1,603 acres of non-merchantable timber. The remaining 779 acres of CFL are comprised of 696 acres of non-forested lowlands (including lowland brush, grass marshes, etc.) and 83 acres of uplands (including upland brush and upland grass). Stumpage rates/values are approximately two to three times higher than 1992 rates for pine and aspen, which comprise the majority of CFL timber in the expansion area (personal communication, S. Grant 1996). Data provided by the Wisconsin Department of Natural Resources identifies factors to be used to estimate the value of lumber and paper product manufacturing earnings and wages, which are associated with timber production or stumpage value: (1) forest product manufacturing value is equal to 20 times the timber stumpage value and (2) forest product manufacturing employment is equal to one person-year for each 28.5 cords of timber production, and each person year of employment contributes \$19,000 in associated wages (Wisconsin DNR 1997). The estimated value of the additional economic activity from manufacturing is identified below following the discussion of CFL timber sale revenues.

From 1986 to 1994, CFL revenues state-wide were \$49.2 million or an average of \$5.5 million per year. These lands produced 5.9 million cord equivalents in the same period or an average of 657,500 cords per year. Annual CFL revenues produced by Wood County from 1986 through 1996 are presented in the following paragraphs. These figures exclude County Park revenues for Dexter Park which comprises 693 acres of special use land within the CFL.

In Wisconsin, trees require 25 years to grow to pulpwood size (for paper) and approximately 50 years to grow to saw-timber size (for lumber); some species can provide small saw-timber in less than 50 years. Because it can take 25 to 50 years for trees to grow into commercially usable timber, harvesting is rotated on different parts of the CFL. Payments for timber sales conducted in any one year may be received that year or in later years, resulting in large differences in revenues from year to year. Average annual gross timber sales revenue on Wood CFL for the past 5 years is \$102,244 (Table 3.2-9).

To minimize annual fluctuations in the timber sale revenues passed on to towns, each town's share is calculated according to their local percentage of the total program acreage, not the amount of timber actually cut in the town in any one year. The expansion area contains 6,162 acres or 16.4 percent of the total Wood CFL. It therefore generated an average of \$16,768 of gross timber sale revenues annually over the past 5 years. The towns receive 10 percent of these revenues from Wood County (i.e., approximately \$1,677 per year, with \$1,384 going to Port Edwards and \$293 going to Remington).

Table 3.2-9
Wood CFL Gross Timber Sales Receipts
(1986-1996) •

| Year | Annual Sales (\$)  |
|------|--------------------|
| 1996 | 114,596.00         |
| 1995 | 150,484.72         |
| 1994 | 5 <b>7,74</b> 9.31 |
| 1993 | 138,391.96         |
| 1992 | 49,996.26          |
| 1991 | 43,396.87          |
| 1990 | 36 <i>,</i> 435.98 |
| 1989 | 31,369.65          |
| 1988 | 26,152.02          |
| 1987 | 26.346.82          |
| 1986 | 29,663.59          |
|      |                    |

Notes:

a. Includes gross timber sales receipts only, not state aid loans.

Source: Wood County 1995b; P. Westegaard 1997.

The amount of the 5-year average annual timber sale revenue for the Wood CFL in the range expansion area is \$16,768. Multiplying this amount by 20, gives an annual manufacturing value of \$335,360. Based upon the 44,967 cords of merchantable timber in the expansion area, and assuming a 50-year rotation, approximately 900 cords would be produced annually, resulting in 32 manufacturing jobs and \$599,640 of related wages. Combining the estimated value of the manufacturing output with the annual wages produces a total annual manufacturing-related value of \$935,000 per year.

#### 3.2.7 Recreation

The expansion area includes 6,162 acres of Wood CFL and 975 acres of privately owned land. County forest lands are open for informal recreational pursuits including but not limited to hunting, fishing, picnicking, snowshoeing, biking, hiking, cross-country skiing, photography, and nature study. Such uses do not require a county permit but must be conducted in accordance with County Ordinances. These public lands are the most easily accessible public hunting land to the City of Wisconsin Rapids. Private lands that are entered into Forest Crop Law contracts are open to the public for hunting and fishing as a condition or their entry into the tax program, whereas Managed Forest Law lands may be designated open or closed, and Woodland Tax Law lands do not allow public access (Wisconsin DNR no date). Those lands in the expansion area that recently transitioned to the Managed Forest Law program are closed to public access. Other private lands are open for recreation use only by permission of the land owner.

Country Air Campground is a privately owned camping facility located in Babcock, approximately 2 miles north of the expansion area. The campground contains 8 acres with approximately 30 camp sites and has been in operation since 1972. It is open year round, but by reservation only, in the off-season. The peak camping season is during the nine-day gun deer hunting season in November, when approximately 300 hunters stay at the campground. Otherwise, approximately 75-100 hunters stay at the campground between September 15-December 31, another half dozen regular customers visit bi-monthly in the summer to walk and view butterflies, and 20 campers visit in the off-season (December-March). Revenues are

\$28,000-\$30,000 annually, including \$3,000 during the nine-day deer hunting season. Many hunters come to the campground specifically to hunt the nearby CFL (personal communication, A. Allison 1995).

A 6-mile portion of a state designated snowmobile trail runs north-south through the western portion of the expansion area in the vicinity of Range Line Road and east-west along the south boundary of the expansion area (i.e., north boundary of the existing range). The trail is designated as Corridor Trail 23 on the Wisconsin Snowmobile Trail Map (Wisconsin Division of Tourism 1993). Wood County contracts with a local snowmobile club to maintain this trail. The trail is part of a system of self-funded snowmobile trails that the State of Wisconsin has adopted by legislative action. Snowmobilers themselves pay for the network of trails that crisscross the state. Monies are generated by snowmobile registration and by state gas taxes on the portion of the fuel used by snowmobilers. The fund is administered by the Department of Natural Resources and cooperating counties that have adopted the program. Wood County receives \$200 per mile to maintain those portions of the trail that are located within its boundaries.

Wood County operates Dexter Park which is located south of Pittsville approximately 7 miles north of the expansion area. Dexter Park contains 1,235 acres of land plus the 298-acre Dexter Lake, and provides 96 camping sites, picnicking, swimming, boating, fishing, hiking trails, cross-country skiing, and snowmobiling. Hunting is not allowed.

Other public recreation areas in the vicinity include Sandhill Wildlife Area (2 miles northwest of the expansion area) and Wood County Wildlife Area (4 miles west), sometimes referred to as Wood County Public Hunting Grounds. Necedah National Wildlife Refuge (3 miles southwest of the expansion area) and Meadow Valley Wildlife Area (4 miles southwest) are located in Juneau County (see Section 3.17).

Sandhill Wildlife Area (SWA) and Meadow Valley Wildlife Area (MVWA) are owned and operated by the Wisconsin Department of Natural Resources. SWA is a gated, controlled access area containing 9,460 acres. Approximately 20,000 visitors participated in a self-guided driving tour through the area in 1991 and 3,000 participant days of hunting and trapping were reported in 1979, according to the SWA Master Plan (personal communication, M. Zeckmeister 1995). Sandhill cranes attract many birdwatchers to the area. Other wildlife include deer and waterfowl. Trumpeter Trail runs through forest and wetland habitats for 14 miles, highlighting points of interest with interpretive signs. Three observation towers provide panoramic views of marsh and surrounding areas. Over 30 education workshops have been provided in 1995 with 900 participants, plus school group programs, and a special two-day deer hunt youth/chaperon program for 400 youths and 200 hunters.

Wood County Wildlife Area (WCWA) contains 21,334 acres consisting of 18,500 acres owned by Wood County and managed by the State of Wisconsin, with the remainder owned by the state or Federal government and managed by the State of Wisconsin. The area is managed to provide habitat for waterfowl and upland wildlife, such as deer, as well as to provide recreational activities such as wildlife and bird watching, hiking, camping, hunting, trapping, and berry picking. In 1981, the most recent date for which information is available, 36,000 hunting and trapping participant days were reported, 3,500 primitive camping and camping participant days, and 5,500 participant days of other recreation activities including hiking, cross-country skiing, and berry picking (personal communication, M. Zeckmeister 1995). Data

on recreation participation at Wood County Wildlife Area is based on a 1981 Management Plan, which has not been updated since that time.

The recently opened Ho-Chunk Rainbow Casino, operated by the Winnebago tribe, is located less than 3 miles from the expansion area and is an attraction for local residents and visitors to the area. Native American concerns are addressed in Section 4.9 of the EIS.

#### 3.2.8 Agriculture

There are over 1,000 farms in Wood County, with a total acreage over 200,000 acres (see Table 3.2-10).

| Table 3.2-10<br>Wood County Land in Farms, 1992 |         |  |
|---|---------|--|
| Farms   | 1,029   |  |
| Land in Farms (acres)                           | 221,357 |  |
| Average Farm Size (acres)                       | 215     |  |
| Total Cropland                                  |         |  |
| Farms   | 971     |  |
| Acres   | 136,769 |  |
| Harvested Cropland                              |         |  |
| Farms   | 941     |  |
| Acres   | 108,810 |  |
| Source: U.S. Census 1994.                       | ·       |  |

Farms in Wood County account for about 1.5 percent of the state total farms and land in farms. The average farm size in the county is 215 acres, compared to the state average of 228 acres. Of the total land in farms, approximately 136,000 acres (or 61.8 percent) is cropland, while the remaining 38.2 percent is pasture and other land.

The total market value of farm land and buildings in Wood County amounted to an average \$228,408 per farm, and an average \$1,040 per acre (see Table 3.2-11). These figures are comparable to the state level average values of \$210,179 per farm and \$925 per acre. The market value of products sold amounted to \$82 million, with an average value per farm of \$80,221. Farm production expenses amounted to \$59 million, averaging \$57,285 per farm. Net cash returns from sales (gross receipts minus expenses) totaled \$23 million, with an average return per farm of \$22,489.

Wood County is the largest cranberry-producing county in the United States and Wisconsin is the leading cranberry-producing state. In 1997 there were 4,031 acres of planted cranberries in Wood County before the spring growing season. This represents 26.5 percent of Wisconsin's 15,195 planted acres.

#### Table 3.2-11 Wood County Farm Values, Expenses, and Net Cash Returns, 1992 Market Value of Land and Buildings Average per farm \$228,408 Average per acre \$1,040 Market Value of Products Sold Total (\$000) \$82,547 Average per farm \$80,221 Farm Production Expenses Total (\$000) \$58,889

\$57,285

\$23,119

\$22,489

Average per farm

Average per farm

Total (\$000)

percent during the same period.

Net Cash Return from Sales

U.S. Census 1994

According to the 1992 Census of Agriculture, cranberry production in Wood County occurred on 40 farms with a total acreage of 3,065 acres (see Table 3.2-12). Wood County contained almost 30 percent of the cranberry-producing farms and acres in the State of Wisconsin in 1992 and cranberry production in the county amounted to 448,821 cwt (hundred weight), representing 31.8 percent of the total state cranberry production. While the number of farms increased by less than 10 percent from 1987 to 1992, cranberry production increased almost 30

| Table 3.2-12 Wood County Cranberry Production, 1992 |         |  |  |  |
|---|---------|--|--|--|
| 1992 Cranberries Harvested                          |         |  |  |  |
| Farms   | 40      |  |  |  |
| Acres   | 3,065   |  |  |  |
| Quantity (cwt) 4 448.821                            |         |  |  |  |
| 1987 Cranberries Harvested                          |         |  |  |  |
| Farms   | 38      |  |  |  |
| Acres   | 2,379   |  |  |  |
| Quantity (cwt)                                      | 384,538 |  |  |  |
| Note: a. cwt = hundred weight                       |         |  |  |  |
| Source: U.S. Census 1994.                           |         |  |  |  |

Hired farm labor in Wood County amounted to 1,645 workers on 389 of the total 1,029 farms (see Table 3.2-13). Payrolls for these workers totaled \$10 million. Approximately 60 percent of these workers worked less than 150 days during the year, and therefore comprise either part-time or migratory workers. The remaining 40 percent of workers, amounting to 632 jobs, worked more than 150 days during the year.

One cranberry farm containing approximately 25 planted acres is currently operating on the proposed expansion area near the intersection of Range Line and Batterman Roads (see Appendix Figure A-1). A typical cranberry farm may contain 10-12 acres of related non-producing natural wetlands, ditches, ponds, reservoirs, and uplands for each acre of cranberry producing wetlands.

### Table 3.2-13 Wood County Hired Farm Labor, 1992

| Ŧ | <b>Hired</b> | Farm | La | hor  |
|---|--------------|------|----|------|
| 1 | шси          | татш | La | DUI. |

| Tined Turni Labor      |              |
|------------------------|--------------|
| Farms                  | 389          |
| Workers <sup>a</sup>   | 1,645        |
| Payroll                | \$10,565,000 |
| Workers by Days Worked | , ,,,,,,,,   |
| More than 150 Days     | 632          |
| Less than 150 Days     | 1.013        |

Note: a. Total agricultural employment as presented in this table may not be consistent with agricultural employment reported by the BEA due to differences in statistical technique and difficulty in quantifying migratory labor.

Source: U.S. Census 1994.

There are approximately 200 growers in the State of Wisconsin and 15,195 planted acres of cranberries in Wisconsin with a crop value exceeding \$143 million and crop size of over 2.2 million barrels (personal communication, T. Lochner 1997). Based on 1997 prices, a farm containing 25 harvested acres could potentially generate approximately \$276,000 annually, assuming 170 barrels of production (i.e., 100 pounds per barrel) per harvested acre and a \$65.00 average price per barrel.

## 4.0 SOCIOECONOMIC EFFECTS OF THE THREE LAND ACQUISITION OPTIONS

This section presents the consequences of implementing the three options for acquiring Federal land for the expansion of Hardwood Range. The impacts discussed include land ownership and land use, population and housing, economic activity, public finance, public services, forestry, recreation, and agriculture. Each section below will present the potential impacts to that particular resource as a result of implementation of the proposed range expansion. Executive Order 12898, Environmental Justice, regarding identification of low-income and minority populations potentially impacted by proposed Federal actions, will be addressed in the EIS and is not covered in this study.

Following discussion of the three options, a separate section applicable to all three options discusses the potential secondary effects of Wood County replacing County Forest Land that would be withdrawn if the range expansion were implemented. This is followed by a section and table summarizing the overall fiscal effect of implementing each option.

The approach used to characterize socioeconomic effects of the three acquisition options for implementing the proposed range expansion includes the following: (1) identification of public and private lands that would be acquired in each of the jurisdictions in the ROI; (2) analysis of resulting changes in management or use of lands currently in forestry, recreation, farming, and transportation (i.e., public roads) uses; (3) identification of relocation requirements; (4) description of changes in economic activity, especially forestry, recreation, and agriculture; and (5) estimation of changes in public revenues and expenditures of local jurisdictions resulting from each acquisition option.

### 4.1 OPTION 1 – FEDERAL LAND ACQUISITION THROUGH FEE PURCHASE

#### 4.1.1 Land Ownership and Land Use

Under Option 1, 6,162 acres of County Forest Land owned and managed by Wood County and 975 acres of privately owned land would be acquired for the proposed range expansion by the Federal government through fee simple purchase. Federal lands comprising the range would, as a result, represent 1.4 percent of the area of Wood County.

Lands transferred from private to Federal ownership would no longer be subject to local zoning or land use regulation. The town of Remington does not have a zoning ordinance. The existing zoning designation for portions of the expansion area within Port Edwards is Agriculture. In addition, private lands would be removed from the tax rolls and public services would generally not be provided. Relocations due to the proposed expansion would affect six year-round residences (three single family units, including one rental, and three mobile homes, including two rentals) and one business (a cranberry farm) located on private lands. In addition, public access to town roads within the expansion area would be limited, and some roads may be gated and closed.

Approximately 300 acres of private lands within the expansion area are currently subject to Woodland Tax Law, Forest Crop Law, or Managed Forest Law (Wisconsin Statutes 77.01 et seq.) contracts. If lands are withdrawn from the tax programs, landowners are subject to a penalty or payment of taxes to offset the prior tax savings received. If the Federal government purchased these lands, they would be withdrawn from the tax programs.

Wood County manages 6,162 acres of county forests in the expansion area for multiple use to provide wildlife habitat, watershed protection, timber harvesting, and public access for recreation use, particularly hunting. These lands would be withdrawn from the CFL program. The potential effect of the proposed range expansion would be to reduce but not necessarily eliminate these uses, since the primary land use function would become a military training range with restricted public access. If public recreation access were controlled in a manner similar to the existing range, recreation use would continue, but locations and times would be limited based on flight schedules and training needs. The proposed target locations, drop zone, and landing zone, which comprise about a third of the expansion area, would be off-limits for recreation, leaving a zone around the inner perimeter of the range of approximately one mile for potential recreation use. A state snowmobile trail (Corridor Trail 23) located in the western and southern part of the expansion area would have to be relocated.

If Option 1 were implemented, the Federal government, rather than Wood County and private owners, would own the land and timber rights in the 7,137 acre expansion area. The Federal government would control timber cutting on the range. Clear cutting may be required on portions of the landing zone. In addition, agricultural uses would be displaced, including a cranberry farm with approximately 25 planted acres, and approximately 129 acres of corn and hay.

#### 4.1.2 Population and Housing

Effects on population and housing from Option 1 would be minimal. The range expansion would result in an increase of three range personnel needed to maintain the range and control public access. No noticeable change in population is anticipated due to personnel changes. Relocation of seven year-round residences and six seasonal residences, including three rentals would be required. Relocation assistance funds would be provided to the affected owners in accordance with Federal property acquisition and relocation procedures.

#### 4.1.3 Economic Activity

Effects on economic activity include potential reductions in timber revenues, and income from agriculture, recreation, and tourism. On a proportional acreage basis, annual gross timber sales receipts from Wood CFL generated by the expansion area averaged approximately \$16,768 over the past five years or 16.4 percent of total Wood CFL receipts. It is assumed that private logging firms that cut the timber received at least this amount of income from selling the timber. Timber revenues from private lands are not known. Owners of approximately 300 acres of private lands within the expansion area are enrolled in forest tax contracts and follow forest management plans and practices, which include timber harvesting. In 1997, approximately 415 acres of privately owned land were in productive forest not covered by tax contracts.

Agricultural activity in the expansion area is primarily associated with a corn, hay, and cranberry farming. There are approximately 109 acres of hay, 20 acres of corn, and 25-35 acres of cranberries. A cranberry farm on approximately 25 planted acres would potentially generate approximately \$276,000 annually based on 1997 prices.

The potential change in timber sale revenues in the expansion area was calculated and used to determine the related change in manufacturing value and related wages. According to Juneau County, use of the existing range for military training has reduced but not eliminated timber sale revenues within the existing range (Dorow 1997). While timber sale revenues within the target area portion of the existing range have been eliminated, those within approximately one-half mile of the target area (i.e., the buffer) have been reduced by approximately 75 percent due to metal fragments from ordnance in the wood, and on the remainder of the range (i.e., the outer fringe area that constitutes the majority of the range), negligible or no reduction has occurred in the value of cut timber. These timber reduction factors were used to estimate the potential reduction in timber sale revenues in the expansion area.

Applying the above factors to the estimated \$16,768 annual Wood CFL revenue for the range, an estimated annual change in timber sale revenue due to the expansion proposal was developed. Although CFL timber sale revenues currently going to Wood County and the two affected towns would potentially be lost, federal timber management and sales would occur, and have been calculated based on the reduced value. (Forty percent of any federal timber profits, after expenses, would be returned to the county, and must be used for schools, but this gain is difficult to estimate and has not been included.) It is assumed that the target complex, drop zone, and landing zone would generate no revenue. The half-mile strip around the target complex together with the remaining fringe area would potentially generate approximately \$13,709 in total annual timber sale revenues. This constitutes a potential annual reduction in timber sales revenue of \$3,059 or 18.2 percent. Assuming a similar reduction of 18.2 percent, paper and lumber products manufacturing and related transportation earnings would be

reduced by \$61,035 and associated wages by \$109,134, for a total reduction in manufacturing-related value of \$170,169 per year.

Revenues from tourism and recreation activities could potentially be lost if recreation on the expansion area is limited or prohibited, and if alternate locations and revenues cannot be found. Removal of 6,162 acres of Wood CFL, would leave 31,374 acres in the county program. The remaining acreage is contained in four areas located 30-60 minutes or less from the expansion area (Figure A-2). Meadow Valley Wildlife Area in Juneau County and Wood County Wildlife Area, both operated by Wisconsin Department of Natural Resources, are located within the vicinity of the expansion area and allow hunting. However, both areas already receive substantial use for hunting and non-consumptive uses, and capacities would be strained by additional use (personal communication, M. Zeckmeister 1995). The recently opened Ho-Chunk Casino, operated by the Winnebago tribe, is located less than 3 miles from the expansion area, and would continue to be an attraction for visitors to the local area who participate in other recreation activities. The range expansion would not directly affect the casino operation.

Hunters and recreationists who utilize the CFL sometimes stay in Wisconsin Rapids, the largest nearby city, which is located less than an hour from the range. If revenues generated by recreationists who utilize the range is reduced and these recreationists no longer come to the local area, this would affect Wisconsin Rapids and nearby camping facilities and retail establishments. Wisconsin Rapids contains approximately a dozen motels. Revenues from lodging, restaurants, and retail establishments would be reduced if fewer tourists visit the area. Other tourists camp at Country Air Campground, a private campground located in Babcock, or at Dexter Park, which is operated by Wood County. Still others participate in roadside or car camping. A number of private hunting cabins in the vicinity of the expansion area are used during the hunting season, especially deer season.

#### 4.1.4 Public Finance

Federal acquisition of the expansion area for Option 1 would affect governmental revenues and expenditures in Wood County, Port Edwards, Remington, and the Pittsville and Nekoosa school districts by removing private land from the tax rolls, changing amounts of intergovernmental aid, and eliminating public revenues derived from County Forest Land. Potential revenue losses to local jurisdictions are summarized in Table 4.1-1. The estimated total annual revenue loss for local jurisdictions from implementation of Option 1 would be approximately \$49,150.

Offsetting these losses would be: (1) funds received by Wood County for the purchase of 6,162 acres of County Forest Land and for a portion of back taxes on lands withdrawn from the Forest Crop Law program; (2) funds received by private land owners for the purchase of 975 acres of property and for any required relocation costs; (3) funds received by the towns for back taxes on lands withdrawn from forest tax programs; and (4) reductions in expenditures for public services in the ROI. The potential revenue losses for each jurisdiction in the ROI are discussed in detail.

# Table 4.1-1 Potential Annual Revenue Loss for Jurisdictions within the ROI

| Jurisdiction  | Revenue Loss |  |  |
|---|--------------|--|--|
| Wood County   | \$23,850     |  |  |
| Town of Port Edwards  | \$13,512     |  |  |
| Town of Remington   | \$5,398      |  |  |
| Pittsville School District  | \$5,185      |  |  |
| Nekoosa School District   | \$0 a        |  |  |
| Mid-State Technical College District  | \$1,205      |  |  |
| TOTAL   | \$49,150     |  |  |
| Note: a. Lands in the expansion area that are loc are either private lands enrolled in Fo |              |  |  |

therefore do not generate school district property taxes.

#### Wood County

Revenues received by Wood County for lands within the expansion area can be divided into own source revenues and intergovernmental revenues (see Table 4.1-2). Own source revenues include property taxes and timber sale revenues. Estimates of property tax revenues accruing to Wood County and each of the other jurisdictions in the ROI are based upon amounts reported on individual property tax bills for 1996 (payable in 1997) for each of the private parcels located in the expansion area. Intergovernmental revenues include the following state sources: road aid, wildlife habitat aid, county conservation aid, and snowmobile trail aid.

lands managed under the Wood County Forest Land program, and

Assessed valuation in Wood County would be reduced by approximately \$602,700 if Option 1 is implemented and private lands in the expansion area are removed from the tax rolls. The county property tax rate in Wood County was \$6.96 per \$1,000 of assessed value in 1996. Property taxes assessed on property within the expansion area, therefore, represent approximately \$4,413 in annual county revenues. Lands in the expansion area that are enrolled in forest tax programs currently generate minimal county property taxes.

Timber sale revenues from the expansion area were estimated based on a prorated (acreage) share of the average annual timber sales revenue generated by Wood CFL over the past 5 years. The estimated amount is \$16,768 annually.

| Table 4.1-2<br>Estimate of Public Revenues from Lan<br>Wood County |                |
|--|----------------|
| Revenue Source   |                |
| Own source aid:  |                |
| Property Taxes   | <b>\$4,413</b> |
| Timber Sale Revenues   | \$16,768       |
| Intergovernmental aid:   | 4-4,- 44       |
| County Forest Road Aid   | \$514          |
| Wildlife Habitat Aid   | \$616          |
| County Conservation Aid  | \$339          |
| Snowmobile Trail Aid   | \$1,200        |
| TOTAL REVENUES   | \$23,850       |

The state pays county forest road aid payments to counties at a rate of \$336 per mile. These roads are primarily used for forest management and hunting and must meet road bed and surface width specifications to qualify for aid. The annual amount currently received by Wood County for the expansion area is \$514 annually for 1.53 miles of County forest roads located in Section 33 from County Line Road to Batterman Road (personal communication, S. Greeno 1997).

Wood County receives \$0.10 per acre of Wildlife Habitat Aid from the state for County Forest Land in order to develop habitat for game and nongame species (personal communication, P. Zatopa 1997). This represents \$616 per year for land within the expansion area. Based on a state-wide annual appropriation pro-rated for the number of acres in each county, Wood County also receives approximately \$0.55 per acre of County Conservation Aid from the state for County Forest Land in order to carry out fish or game management projects. This represents \$339 per year for land within the expansion area.

Wood County receives \$200 per mile for maintenance of approximately 6 miles of state snowmobile trails for Trail Corridor 23 that passes through the expansion area, for a total of \$1,200 per year. The county contracts with a local snowmobile club to maintain the trail.

In the past, Wood County has received state aid in the form of a non-interest bearing loan credited to its forestry fund account, to be used for the purchase, development, preservation and maintenance of the county forest lands or for specific related projects. The loan balance is currently zero in this account. Other intergovernmental aid in the form of shared revenues, passed on to the county and towns from the state, would be minimally affected by the expansion proposal (personal communication, K. Sealy 1997).

The acquisition of land by the Federal government would produce a one-time county gain if the land were purchased, and possible ongoing revenues if these funds were invested. Also, reductions in county revenues due to implementation of Option 1 may be partially offset by decreases in county expenditures in the expansion area. This would result from potential reductions in services such as road maintenance, fire protection, and public safety, which would be provided by ANG or through mutual support agreements. In addition, lands withdrawn from the County Forest Land program would no longer require management under this program and related county conservation activities would not be undertaken. If the range expansion occurs, the amount of time and money committed to the Wood County Forest as a whole is expected by the county to remain approximately the same on an annual basis regardless of the possible change in total CFL acreage.

Since the expansion area is sparsely populated and is primarily comprised of County Forest Land, those county expenditures directly benefiting this area, with the exception of forest management and related conservation activities, are probably relatively low compared to more densely populated portions of the county. In addition, 80 acres of lands in the expansion area would be removed from the Forest Crop Law program and would generate an estimated \$2,006 in back taxes for Wood County.

# Town of Port Edwards

The local property tax rate in Port Edwards was \$0.65 per \$1,000 of assessed value in 1996. Property within the expansion area generates approximately \$264 in local property taxes (see

Table 4.1-3). The town's assessed valuation would be reduced by approximately \$407,000 if private lands in the expansion area were removed from the tax rolls.

| Table 4.1-3<br>Estimate of Public Revenues from Lar<br>Town of Port Edw | <del>-</del> |
|---|--------------|
| Revenue Source  |              |
| Own source aid:   |              |
| Property taxes  | \$264        |
| Timber Sale Revenues  | \$1,384      |
| Intergovernmental aid:  |              |
| Road aid  | \$10,339     |
| Payment in lieu of taxes  | \$1,525      |
| TOTAL REVENUES  | \$13,512     |

Of the gross receipts generated from all timber sales on the county forests, 10 percent is paid annually by the county to the towns having county forest lands on the basis of the acreage of such lands in the towns. County Forest Land located in the expansion area in the town of Port Edwards comprises 5,082 acres or 13.54 percent of the county forest in Wood County. Based upon an average of the last five years, the town receives approximately \$1,384 in timber sale revenues per year attributable to the expansion area. This estimate is based on total average annual timber sale revenues of \$102,244 per year from 1992 through 1996 for Wood County. Ten percent of this amount is then shared by qualifying towns based upon their respective share of all Wood County Forest Land.

Towns in Wisconsin received \$1,432 per mile of transportation aid from the state for public roads in 1997 (personal communication, S. Greeno 1997). To qualify for aid, these roads must: (1) be public roads through due process of law; (2) show some evidence of travel by two-wheel drive automobiles (i.e., would not qualify for aid if only used for four-wheel drive vehicles); and (3) be open, not closed by a gate or other obstruction, but may be closed due to construction, weather conditions, etc., during short seasons of the year. Port Edwards receives approximately \$10,339 in road aid on an annual basis for approximately 7.22 miles of roads that may be closed due to implementation of Option 1. Roads affected include portions of County Line Road, Batterman Road, Beaver Lane, and Range Line Road.

The state makes an annual payment of \$0.30 per acre to every town containing county forest lands. This payment in lieu of taxes (PILT) helps offset the loss of property tax revenues. Port Edwards receives approximately \$1,525 of PILT on an annual basis for 5,082 acres of county forest.

If lands in the expansion area were purchased by the Federal government, approximately 290 acres of private lands within Port Edwards would be withdrawn from existing forest tax contracts. Landowners participating in the Managed Forest Law program would pay an estimated \$3,704 to the town in back taxes based on the current repayment formula. Initial estimates of withdrawal costs for landowners participating in the Forest Crop Law program are \$13,376 of which approximately \$8,694 or 65 percent would go to the town and \$2,006 or 15 percent to the county. The latter estimate is based on recent withdrawals in another town in Wood County, since there were no examples in Port Edwards. The estimate could have been approximately three times higher if the highest examples in Wood County were used. In the

event that these lands are withdrawn from the tax programs, repayment costs which have been estimated by the DNR Forest Tax Section for use in this study, would be individually calculated. Repayments under the Forest Crop Law program would be shared by the state, Wood County, and the town, with the majority of funds, approximately 65-75 percent, going to the town (personal communication, K. Hujanen 1998).

#### Town of Remington

The local property tax rate in Remington was \$2.69 per \$1,000 of assessed value in 1996. Property within the expansion area generates approximately \$527 in local property taxes (see Table 4.1-4). The town's assessed valuation would be reduced by approximately \$195,700 if private lands in the expansion area were removed from the tax rolls.

| Table 4.1-4 Estimate of Public Revenues from Land in the Expansion Area, Town of Remington |         |  |  |  |
|--|---------|--|--|--|
| Revenue Source   |         |  |  |  |
| Own source aid:  |         |  |  |  |
| Property taxes   | \$527   |  |  |  |
| Timber Sale Revenues   | \$294   |  |  |  |
| Intergovernmental aid:   |         |  |  |  |
| Road aid   | 4,253   |  |  |  |
| Payment in lieu of taxes   | 324     |  |  |  |
| TOTAL REVENUES   | \$5,398 |  |  |  |

County Forest Land located in the expansion area in Remington comprises 1,080 acres or 2.88 percent of the county forest in Wood County. Based on the past 5 years, the town receives an average of \$294 in forest severance revenues per year attributable to the expansion area.

Remington receives approximately \$4,253 in road aid on an annual basis for approximately 2.97 miles of roads that may be closed due to implementation of Option 1 (personal communication, S. Greeno 1997). Roads affected include portions of Batterman Road, McKeel Road, Range Line Road, and County Line Road.

The state makes an annual payment of \$0.30 per acre to every town containing county forest lands. This PILT helps offset the loss of property tax revenues. The town of Remington receives approximately \$324 of PILT on an annual basis for 1,080 acres of county forest.

Approximately 36 acres of private land within the Town of Remington are currently enrolled in a Woodland Tax Law contract that expires in 1999, and would not be transferred to the Managed Forest Law program (personal communication, S. Grant 1997). At the termination of the contract, the participating landowner would pay the town an estimated \$3,380 in back taxes (personal communication, K. Hujanen 1998). If the range expansion were implemented after 1999, this revenue would already have accrued to the town and is not identified as revenue resulting directly from the project.

#### Pittsville School District

Lands in the proposed expansion area fall within either the Pittsville or Nekoosa school districts. The 6,162 acres of County Forest Land in the expansion area generate no property taxes for the school districts. In addition, portions of the remaining 975 acres of private land in the expansion area are contracted under various forest tax programs program and pay no taxes to the school districts. Private property in the Pittsville School District not contracted under these programs had a total assessed value of \$602,700 in 1996 and generated approximately \$5,185 in property tax receipts based on a tax rate of \$8.60 per \$1,000 of assessed value.

With the transfer of private property to Federal ownership, all property tax revenues would be lost. Based on the state equalization aid formula, if the school district lost approximately \$618,200 in assessed valuation; (i.e., \$602,700 on which school taxes are assessed, plus an additional \$15,500 in Forest Crop land assessment for which school taxes are not paid), the amount of state equalization aid would increase by approximately \$5,025 offsetting most of the revenue loss (personal communication, J. McIntosh 1997).

#### Nekoosa School District

Lands in the expansion area that are located in the Nekoosa School District are either private lands enrolled in Forest Crop contracts or public lands managed under the Wood County Forest Land program, and therefore do not generate school district property taxes. There is one parcel of land contracted in the Forest Crop program. It is 40 acres in size and its assessed value is \$17,500.

## Mid-State Technical College District

Private lands in the expansion area also generate a small amount of property taxes for the Mid-State Technical College District, which would be lost, totalling approximately \$1,205.

#### 4.1.5 Public Services

Federal ownership of the land and timber rights within the expansion area would result in potential reductions in county and town services such as road maintenance, fire protection, and public safety, which would be provided by ANG or through mutual support agreements. County forest withdrawn from the CFL program would no longer require management under this county program and related forest management and county conservation activities would not be undertaken.

#### 4.1.6 Forestry

Under Option 1, the land and timber rights on the 7,137-acre range expansion area would be owned by the Federal government. The Federal government would control timber cutting on the range and would receive revenues from any timber sales. If Federal revenues are generated from forest management activities on the range, 40 percent of net revenues remaining after expenses are paid would be returned to the state. The state is required to pass these funds directly to the counties who must use them to offset school costs. The remaining net revenues (60 percent) would be placed in a Forestry Reserve Account and must be used for forest management. Withdrawal of County Forest Land would potentially decrease forest management activities on the range. Federal ownership of the timber rights could potentially

reduce the volume and value of timber cut on the range if costs of managing the timber cutting program are increased due to the limited area being managed and less timber is harvested as a result, if timber cutting areas or times conflict with training uses of the range, or if the quality of timber is reduced due to metal fragments or damage from training activities. Local timber firms would still receive income from timber cutting if they bid successfully on Federal timber sales contracts. Although specific site development plans have not been developed for facilities in the range expansion area, some estimates can be made for land and tree clearing requirements. To reduce potential costs, the landing strip will most likely be located on an existing roadway with an additional area (approximately 100 total acres) added on either side for wing clearance. The landing strip area will be used as the drop zone in most cases. There are currently no plans to remove trees and alter large areas in the proposed expansion area for new target locations because enough clearings and dirt roads currently exist to meet most requirements. The targets will be relatively small and, using the existing range as a model, the disturbance for the actual tactical targets will probably be limited to less than 100 acres. This would bring the total area disturbed under the proposal for land and tree clearing to approximately 200 acres.

Implementation of Option 1 would result in 6,162 acres of land being withdrawn from the Wood CFL program. The legal means by which counties may apply for withdrawal of lands from county forests is provided by section 28.11(11)(a) Wisconsin Statutes. (Section 28.11 addresses the establishment and administration of the county forests.) The benefits after withdrawal must outweigh the benefits of continued entry and the lands must be put to a better and higher use (Wisconsin DNR 1995b). The withdrawal would require approval by the Wood County Board of Supervisors and the Wisconsin DNR. In accordance with the Wisconsin Environmental Policy Act (WEPA), withdrawal of County Forest Land from the program also requires preparation of an Environmental Assessment (EA) or an EIS by the Wisconsin DNR, however part or all of the Federal EIS could be adopted by DNR as part of its independent analysis for the state's EA or EIS.

Under an existing Wood County ordinance, funds received from sale of County Forest Land withdrawn from the CFL program must be used to purchase other land for this program. Wood County has mapped the county forest boundaries (see Figure A-2), referred to as "blocking boundaries," which include private lands not owned by the county, but which it considers "would make logical inclusions in the county forest for management purposes."

State-wide data for County Forest Lands from FY 1994-95 indicates total timber sales of more than \$9.75 million for that year (Wisconsin DNR 1995b). This included 14.7 million board feet of saw timber and over 793,000 cords of various species. Comparing 1995 appraisal data for the expansion area CFL to the 1994-95 state-wide CFL timber sales volume, and assuming 2 percent of the merchantable timber in the expansion area is harvested per year based on a 50 year rotation, the expansion area would represent 0.3 percent or less of the annual state-wide CFL cords, board feet, and sales value.

A 1997 appraisal identified almost 2.9 million board feet and 45,000 cords of merchantable timber on the Wood County Forest property in the expansion area, with a value of \$1.2 million (Wisconsin DNR 1997). Appendix A contains the appraisal data sheet. Assuming a 50-year rotation, annual stumpage value would be \$24,000 for the expansion area or 21 percent of the Wood CFL sales in 1996, the most recent year reported.

#### 4.1.7 Recreation

If Option 1 is implemented, effects on recreation would include withdrawal of 6,162 acres of land from the County Forest Land program and 80 acres of land from Forest Crop contracts which currently provide public recreation opportunities, and closure of a six mile portion of a state snowmobile trail. The county forest lands currently provide public recreation opportunities such as hunting, trapping, wildlife viewing, hiking, snowmobiling, picnicking, berry picking, and cross-country skiing. Removal of 6,162 acres would represent a loss of 16.4 percent of the Wood County forest, leaving 31,374 acres in the county program. The remaining acreage is contained in four areas located approximately 30-60 minutes from the expansion area (Figure A-2).

Public access to land acquired for the range expansion would continue for recreational uses based upon appropriate operational and safety parameters. Wood County Forest Land located outside the expansion area, including approximately 31,000 acres, would continue to be available for recreation use. Other public lands in the area provide recreation opportunities as described below, although some areas may be nearing capacity for hunting, and increased non-consumptive use would create additional demand pressures. Recreation effects are considered to be adverse but not significant. These effects are discussed below.

Use of nearby state recreation areas such as the Meadow Valley Wildlife Area, Sandhill Wildlife Area, and Wood County Wildlife Area, and the Necedah National Wildlife Refuge, would potentially increase. Hunting, one of the most popular recreation uses of the expansion area, is allowed at each of these areas. Hunting use at Meadow Valley and Wood County wildlife areas is near capacity and increased use could have an adverse effect (personal communication, M. Zeckmeister 1995). If non-consumptive use of the expansion area is reduced, and non-consumptive use increases on other nearby public lands, use conflicts between hunters and other recreationists would increase.

The Wood CFL in the expansion area is the most easily accessible public hunting land to the City of Wisconsin Rapids. Reductions in tourism and related revenues are possible for Wisconsin Rapids, however data is not available on the volume of use. Camping revenues at Dexter Park, operated by Wood County, and County Air Campground, a private facility, could decrease if current users of the expansion area substitute other recreation sites, camping facilities, motels, or roadside camping locations. The recently opened Ho-Chunk Rainbow Casino, operated by the Winnebago tribe, is located less than 3 miles from the expansion area, and would continue to be an attraction for visitors to the local area.

Federal ownership of the expanded range would result in restrictions being placed upon recreation use within the range. If recreation access were allowed in a manner similar to the existing range, recreation users would need to check-in at the range building complex except during the nine-day gun deer hunting season. A perimeter area of approximately one mile on the east, west and north border of the expansion area would potentially remain available for recreation use, depending upon training activities and schedules.

Approximately 6 miles of state snowmobile trail Corridor 23 located in the vicinity of County Line Road and Range Line Road would be closed in the western portion of the range expansion area. Corridor 23 is a continuous north-south corridor trail that extends for more than 300 miles across central Wisconsin. This portion of the trail links New Miner in Juneau County to

Babcock in Wood County. The trail is maintained by the Yellow River Riders, a local snowmobile club, under contract to Wood County. If relocation of the trail were investigated, factors to be considered would include potential costs for brush removal and clearing, grading, signing, and bridge construction, if creeks are crossed (personal communication, L. Freidig 1995). Other considerations include retention of the trail's north-south continuity, the amount of vehicular traffic sharing the right-of-way if a public road were used, and the possibility of creating a perimeter snowmobile trail along the east and north boundary of the range utilizing fire lanes that have been cleared by the ANG (personal communication, P. Hoffman 1995). Relocation would require planning and capital costs and on-going maintenance. The trail transiting the expansion area is integral to the network of trails in the area and provides north-south continuity.

The cost of snowmobile trail reconstruction is approximately \$500 per mile at the low end, and can cost considerably more depending upon terrain, rockiness, and the amount of vegetation removal needed. If bridges for creek crossings are needed, costs are considerably higher. The state has a grant program for construction of new trails, however, funding is very limited and no new trails were added in 1997 (personal communication, L. Freidig 1997).

### 4.1.8 Agriculture

A cranberry farm of approximately 250 acres with 25 planted acres, would be displaced by the expansion area, and approximately 129 acres of corn and hay. This loss would comprise 2.5 percent of the 40 cranberry farms in Wood County in 1992 and approximately 0.5 percent of the 200 cranberry growers statewide. It would comprise approximately 0.6 percent of the planted acreage of cranberries in Wood County in 1997 and 0.2 percent of the acreage statewide. Because the affected property is located in the vicinity of the proposed drop zone and near the proposed target locations, and not on the perimeter of the range expansion area, the effects of training activities on this property may adversely affect returning this property to use as a cranberry bog at a future point, if military use were discontinued.

A number of cranberry farms are located adjacent to the range expansion area, particularly to the northeast near Cranmoor. Maintenance of the system of ditches, dams, and reservoirs that supply water and drainage to these farms is important to their successful operation. The ANG has an agreement with the owner of a cranberry farm located south of the existing range regarding ditch maintenance, fire protection, and access on private property and the adjacent range property. Similar agreements would be worked out with affected owners bordering the proposed expansion area, so that impacts on cranberry farms in the vicinity would be minimized (Wisconsin ANG 1997).

# 4.2 OPTION 2 — FEDERAL GOVERNMENT LEASES LAND FROM EXISTING OWNERS

### 4.2.1 Land Ownership and Use

No change in land ownership would occur under this option. It is likely that land use changes would be similar to implementation of Option 1 since, regardless of ownership, if land is leased for the range, 6,162 acres of county forest would be withdrawn from the CFL program and lease restrictions would be placed upon private lands restricting or prohibiting forestry, recreation, agricultural and residential uses.

## 4.2.2 Population and Housing

Effects on population and housing would be virtually the same as Option 1, except that relocation requirements and assistance would not apply since the Federal government would not be purchasing property. Any occupied properties would still need to be vacated by existing owners because of military use of these lands, but this would be addressed in the lease agreement with each owner.

#### 4.2.3 Economic Activity

Economic effects on forestry, agriculture, and recreation would be similar to Option 1 since the types of uses allowed through lease agreements would be similar to those allowed if the Federal government owned the land in the expansion area. Since Wood County currently manages a county-wide forestry program, it is possible that forestry activity and income might be higher if existing owners (i.e., Wood County and private owners) retain the timber rights rather than the Federal government owning these rights. However, while still owned by Wood County, it is assumed that the 6,162 acres now in the county forest program would be withdrawn from this program because of conflicts with public use requirements of the County Forest, which could potentially change the county's management of this property.

#### 4.2.4 Public Finance

As compared to Federal ownership, leasing would reduce the potential annual loss of public revenues by jurisdictions in the ROI, since private lands would remain on the tax rolls and property taxes would still be collected. However, this private property may be reassessed because of the change in use, and could potentially be given a lower assessment because of direct military use. This potential lower valuation would result in a reduction in property taxes collected.

Loss of intergovernmental aid such as road aid, wildlife habitat aid, county conservation aid, snowmobile trail aid, and payments in lieu of taxes would still occur. County timber sale revenues and private timber sale revenues would be retained if present owners retained the timber rights, but would be lost if the Federal government obtained these rights. There would be some loss of timber value and revenues due to reduced quality of timber from metal in trees and reduced access to portions of the range. It is assumed that restrictions would still be placed upon timber cutting schedules and locations, even if the present owners retain the timber rights. It is anticipated that the potential loss of revenues accruing to local government agencies (property taxes, timber sale revenues, intergovernmental transfers) would be addressed in the terms of the lease negotiated between the concerned parties.

#### 4.2.5 Public Services

As compared to Federal ownership, if the Federal government were to lease land from the county and private owners, responsibility for provision of public services would remain with the town and county unless stipulated otherwise in the lease agreement or mutual aid agreements.

#### 4.2.6 Forestry

The public forest would continue to be under legal control of the county, although lands would be removed from the county forest program. Limitations on forestry would result due to operation of the range. Timber rights would be stipulated in the lease arrangement, with either Federal ownership or existing ownership. For all options, timber management would be more difficult because of factors such as reduced timber value, range restrictions, and metal fragments in trees.

#### 4.2.7 Recreation

Recreation effects under this lease option, assuming either form of timber rights, would be similar to Option 1.

#### 4.2.8 Agriculture

Agriculture effects under this lease option, assuming either form of timber rights, would be similar to Option 1 for forestry, farmland, and cranberry operations.

# 4.3 OPTION 3 – FEDERAL GOVERNMENT LEASES LAND FROM THE STATE OF WISCONSIN DEPARTMENT OF MILITARY AFFAIRS

#### 4.3.1 Land Ownership and Use

Under this option, it is assumed that all existing private and county lands in the expansion area would be purchased by or traded to the State of Wisconsin Department of Military Affairs, and would then be leased to the Federal government. It is likely that land use changes would be similar to implementation of Option 1 or the option of leasing from existing county and private owners, since, regardless of ownership, if land is leased for the range, 6,162 acres of county forest would be withdrawn from the CFL program, 7,137 acres would be used for military training activities, and public access to the range would be restricted.

#### 4.3.2 Population and Housing

Effects on population and housing would be virtually the same as Option 1, except that state rather than Federal relocation requirements and assistance may apply since the land would be acquired by the state, and the Federal government would not be purchasing property. Any occupied properties would still need to be vacated by existing owners because of military use of these lands.

#### 4.3.3 Economic Activity

Economic effects on forestry, agriculture, and recreation would be similar to Option 1 since it is assumed that the types of uses allowed through lease agreements would be similar to those allowed if the Federal government owned the land in the expansion area. Since Wood County currently manages a county-wide forestry program, it is possible that forestry activity and income might be higher, if existing owners (i.e., Wood County and private owners) retain the timber rights rather than the Federal government owning these rights. However, it is assumed that the 6,162 acres now in the county forest program would be withdrawn from this program

if the lands were state-owned, which could potentially change the county's management of this property.

#### 4.3.4 Public Finance

Option 3 is comparable to Option 1 with regard to loss of property taxes and intergovernmental aid, since private lands would be removed from the tax rolls due to state ownership directly as a result of the Federal action.

Under this option, loss of intergovernmental aid such as wildlife habitat aid on county forests, payments in lieu of taxes on county forests, and county conservation aid, would be similar to Federal ownership or leasing from existing owners, since these losses would occur due to state ownership. Other intergovernmental aid, such as county and town road aid and snowmobile trail aid, would be lost directly as a result of Federal leasing from the state, since closure of roads and trails would occur. County forest sales revenues would be retained if the county retained the timber rights, but would be lost by the county if the Federal government obtained these rights. It is assumed that restrictions would still be placed upon timber cutting schedules and locations, even if the county retains the timber rights.

The acquisition of land by the state would produce a one-time county gain if the land were purchased (and possible additional annual revenues if funds were invested) or a one-time gain of real property assets if the land were acquired through a trade.

#### 4.3.5 Public Services

If the Federal government leases land from the state, responsibility for provision of public services would remain with the state unless stipulated otherwise in the lease agreement or in mutual aid agreements with the towns or county.

#### 4.3.6 Forestry

The county forest in the expansion area would be withdrawn from the CFL program when the state acquire land in the expansion area as a result of the Federal action. Timber rights would be stipulated in the lease arrangement, with either Federal ownership or county ownership. County ownership could result in continued timber sales revenues for Wood County. However, limitations on forestry activities could result in reduced production since retention of timber rights by the county would still be subject to timber cutting restrictions due to military use of the range.

#### 4.3.7 Recreation

Recreation effects under this lease option, assuming either form of timber rights, would be similar to Option 1.

#### 4.3.8 Agriculture

Agriculture effects under this lease option, assuming either form of timber rights, would be similar to Option 1 for forestry, farming, and cranberry operations.

# 4.4 POTENTIAL SECONDARY EFFECTS FROM REPLACEMENT OF COUNTY FOREST LAND IN WOOD COUNTY

For each of the three options discussed above, 6,162 acres of County Forest Land would be withdrawn from the CFL program if the range expansion proposal were implemented. Potential secondary effects would occur if Wood County acquired private lands elsewhere in the county to replace land in the CFL program. Since there is no formal proposal by Wood County to replace this land, the location of these replacement lands is not known. It is assumed that if Wood County chooses to replace the lost CFL, the replacement lands would be located in sparsely populated forested areas or cropland mixed with forest lands, and may be contiguous to or within existing county forest blockings. Wood County has conducted preliminary investigations of possible locations of replacement lands for the CFL and has indicated that local opposition was encountered and is likely to be encountered at other locations (personal communication, P. Westegaard 1997).

#### 4.4.1 Land Ownership and Use

Wood County has indicated that that because of land use and ownership patterns, the likelihood of obtaining another large, contiguous block of forest is unlikely. Therefore, non-forested lands or croplands mixed with forested lands are more likely, as well as holdings that are less contiguous than the existing expansion area holdings of CFL.

Potential land use changes would be management of formerly private lands for multiple use under the County Forest program, including forest management and timber harvesting, public access for recreation, watershed protection, and habitat conservation. Temporary logging roads may be created by timber cutting firms. Depending upon the current use of any replacement lands, public recreation access to lands previously unavailable for such use could occur, however, if replacement lands already allow public recreation access, there could be a net loss of recreation lands. Large blocks of private contiguous, forested lands are not readily available for public acquisition in Wood County. If a substantial percentage of the replacement lands contained idle farmland, reforestation would require additional capital and start-up costs. In addition, in the past, citizens in towns containing possible replacement lands have opposed such efforts because of potential tax base losses. Depending upon the location of replacement lands, which is not currently known, possible displacement of existing residential, agricultural, and other uses could occur, however it is assumed that replacement lands would largely consist of sparsely populated or unoccupied private forest land, or a mix of cropland and forest lands.

#### 4.4.2 Population and Housing

Potential effects on population and housing may include the county acquiring lands that contain residences that would be vacated by existing owners. Wood County has a policy to acquire lands only from willing sellers. Specific locations of lands are not yet known and would probably be sparsely populated or unpopulated. In some cases, private lands with residences have remained within the interior of county forest blockings, rather than being purchased (Wisconsin DNR 1995b).

#### 4.4.3 Economic Activity

If Wood County acquires private forest lands, county income might increase compared to private forest ownership, since Wood County actively manages a county-wide forestry program which includes timber cutting. Revenues from recreation and tourism may also increase since public access for recreation would be required.

#### 4.4.4 Public Finance

Acquisition of 6,162 acres of private forest lands by the county would result in removal of these lands from the tax rolls and a potential annual loss of property taxes to jurisdictions in the ROI. Some increase in intergovernmental aid, such as wildlife habitat aid on county forests, payments in lieu of taxes on county forests, and county conservation aid, would be received. Other intergovernmental aid, such as county and town road aid would probably remain unchanged. County forest sales revenues would be received by the county on these lands and a 10 percent share of revenues would be received by the affected town according to their acreage share of Wood CFL. Based on existing conditions in the Wood County Forest, it is assumed that some private forest lands currently enrolled in woodland and forest crop tax programs may remain within the interior of acquired forest blockings. County forest loan aid would also become available from the state.

#### 4.4.5 Public Services

If the county acquires private lands, responsibility for provision of public services such as fire protection and law enforcement would be county responsibilities unless agreements with the town are developed. Maintenance of most existing public roads by town would continue.

#### 4.4.6 Forestry

County ownership of 6,162 acres of private forests would result in timber sales revenues for Wood County. If a range expansion option is implemented which includes timber rights ownership by the county on lands withdrawn from the CFL, then total timber harvesting revenues from county forestry could increase if withdrawn lands are replaced. Large blocks of private contiguous, forested lands are not readily available for public acquisition in Wood County. If a substantial percentage of the replacement lands contained idle farmland, reforestation would require additional capital and start-up costs.

#### 4.4.7 Recreation

Depending upon the current use of any replacement lands, public recreation access to lands previously unavailable for such use could occur and could offset partial loss of recreation access to lands in the expansion area. However, if replacement lands currently allow public recreation access, there could be a net loss of recreation lands.

#### 4.4.8 Agriculture

Existing agricultural uses on private lands would be displaced if such lands were to be acquired for the county forest. In some cases, private agricultural lands have remained within the interior of existing county forest blockings, rather than being purchased.

### 4.5 SUMMARY OF FISCAL EFFECTS

Table 4.5-1 provides a summary table showing the potential direct fiscal effects of the three land acquisition options on the public finances of local jurisdictions in the ROI. Estimated dollar amounts are shown for effects that can be estimated. Effects for which dollar amounts can not be estimated at this time are identified for comparative purposes. Differences in fiscal effects between the options are primarily caused by the loss of 975 acres of private land from the tax rolls if the proposal is implemented using either a Federal land purchase or a state land purchase or trade, rather than Federal leasing of land from existing owners, and the difference between a one-time payment for purchase of these lands (plus future returns, if invested) compared to annual lease payments. Fiscal effects on Wood County do not include the potential indirect effects of the County acquiring lands to replace CFL withdrawn from the expansion area, or the resulting effects on the tax base of the county, local town, or school districts in the replacement area.

Option 1, Federal purchase in fee of lands in the expansion area would result in a potential combined total fiscal loss of approximately \$49,150 per year in Wood County, the towns of Port Edwards and Remington, the Pittsville School District, and the Mid-State Technical College District. This potential loss would be offset by funds received on a one-time or annual basis for: (1) Federal purchase of land in the expansion area, which would produce a one-time gain to Wood County and private owners and potential future return if these funds were invested (the amounts are not known at this time); (2) one-time payment of tax penalties to local jurisdictions by private land owners for lands that would be withdrawn from forest tax contracts, resulting in one-time payments to Wood County of approximately \$2,006 and Port Edwards of approximately \$12,398 (3) annual reductions in expenditures for public services such as roads (i.e., an annual benefit to Wood County, Remington, and Port Edwards); and (4) increases in annual state equalization aid to the Pittsville School District that would offset most tax losses.

Option 2, Federal leasing of lands from existing owners (i.e., from Wood County and private owners), would result in a combined total fiscal loss of approximately \$37,556 per year in Wood County, and the towns of Port Edwards and Remington. The school districts and technical college district would not be directly affected since no lands would be removed from the tax rolls. Unknown reductions in assessed valuations due to direct military use of private lands would occur, resulting in decreased tax revenues. The potential loss of \$37,556 would be offset by funds received on a one-time or annual basis for: (1) Federal leasing of land in the expansion area, which would produce annual payments to Wood County and private owners, although the amounts are not known at this time; (2) payment of tax penalties to local jurisdictions under the two forest tax programs in the same amounts described under Option 1; and (3) reductions in expenditures in the expansion area by local jurisdictions for public services, as described in Option 1.

Option 3, Federal leasing of lands from the State of Wisconsin, would result in a fiscal loss of approximately \$49,150 per year in Wood County, and the towns of Port Edwards and Remington, similar to Option 1. For purposes of this study, it has been assumed that private lands would be removed from the tax rolls as a result of State acquisition of land in the expansion area, directly as a result of the Federal range expansion action. Likewise, other fiscal changes would result at the time of the transfer to State ownership, including the following: county receipt of funds or real property assets (in trade) for public lands in the expansion area; gains in state equalization aid for school districts due to removal of land from the tax rolls;

# Table 4.5-1 COMPARISON OF POTENTIAL FISCAL EFFECTS ON LOCAL JURISDICTIONS IN THE ROI, THREE LAND ACQUISITION OPTIONS FOR THE EXPANSION OF HARDWOOD RANGE

|   | OPTION 1: FEDE         | RAL PURCHASE OF EXPANSION<br>AREA   | OPTION 2: FED              | eral Lease from Existing<br>Owners   | OPTION 3: FEDERAL LEASE FROM STATE |                   |
|---|------------------------|---|----------------------------|--|------------------------------------|-------------------|
|   | Annual<br>Revenue Loss | Benefit   | Annual Revenue<br>Loss (b) | Benefit  | Annual Revenue Loss                | Benefit           |
| Wood County (a)                         | \$23,850               | Funds from Federal purchase of CFL Reduced service expenditures \$2,006 tax payments from one-time penalty on land withdrawn from Forest Crop Law contracts                               | \$19,437                   | Annual lease payments Reduced expenditures for services Funds from one-time tax payments for withdrawn Forest Cropland Tax \$2,006 | Same as Option 1                   | Same as Option 1  |
| Town of Port Edwards                    | \$13,512               | Reduced service expenditures One-time penalty of \$3,704 on land withdrawn from Managed Forest Law contracts One-time penalty of \$8,694 on land withdrawn from Forest Crop Law contracts | \$13,248                   | Same as Option 1   | Same as Option 1                   | Same as Option 1  |
| Town of Remington                       | \$5,398                | Reduced service expenditures  | \$4,871                    | Same as Option 1   | Same as Option 1                   | Same as Option 1  |
| Pittsville School District              | \$5,185                | \$5,025 gain in state equalization aid  | 0                          | 0  | Same as Option 1                   | Same as Option 1  |
| Nekoosa School District                 | 0                      | Negligible change in state equalization aid   | 0                          | 0  | Same as Option 1                   | Same as Option 1  |
| Mid-State Technical<br>College District | \$1,205                | None  | 0                          | 0  | Same as Option 1                   | Same as Option 1  |
| TOTAL (c)                               | \$49,150               | As itemized above   | \$37,556                   | As shown above   | \$49,150                           | As itemized above |

Notes:

- Fiscal effects on Wood County do not include potential indirect effect of County purchasing lands to replace County Forest Land withdrawn due to the range expansion, any related revenue losses from removing private lands from the tax rolls, or related gains in timber sale revenues or intergovernmental aid resulting from new acquisition of County Forest Land.
- (b) Potential annual revenue losses do not account for possible reductions in assessed valuations that may result from military use of private lands leased to the federal government.
- (c) Reduced sales of timber, cranberries, and other crops would create estimated reductions in wages and earnings from agriculture and related activities. These potential losses to the local economy would be in addition to the public revenue losses identified above and would be the same for the three acquisition options.

payments to local jurisdictions for tax penalties on private lands withdrawn from forest tax programs; potential loss of other forms of state conservation aid; and loss of property taxes and forest severance revenues.

## 5.0 LIST OF ACRONYMS

ANG Air National Guard

ANGB Air National Guard Base

BEA U.S. Bureau of Economic Analysis

CFL County Forest Land

CRTC Combat Readiness Training Center
DNR Department of Natural Resources

EA Environmental Assessment

EIS Environmental Impact Statement

FY fiscal year

ILUMP Integrated Land Use Management Plan

MVWA Meadow Valley Wildlife Area

NEPA National Environmental Policy Act

PILT payment in lieu of taxes

ROI Region of Influence SWA Sandhill Wildlife Area

WCWA Wood County Wildlife Area

WEPA Wisconsin Environmental Policy Act

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# Appendix A



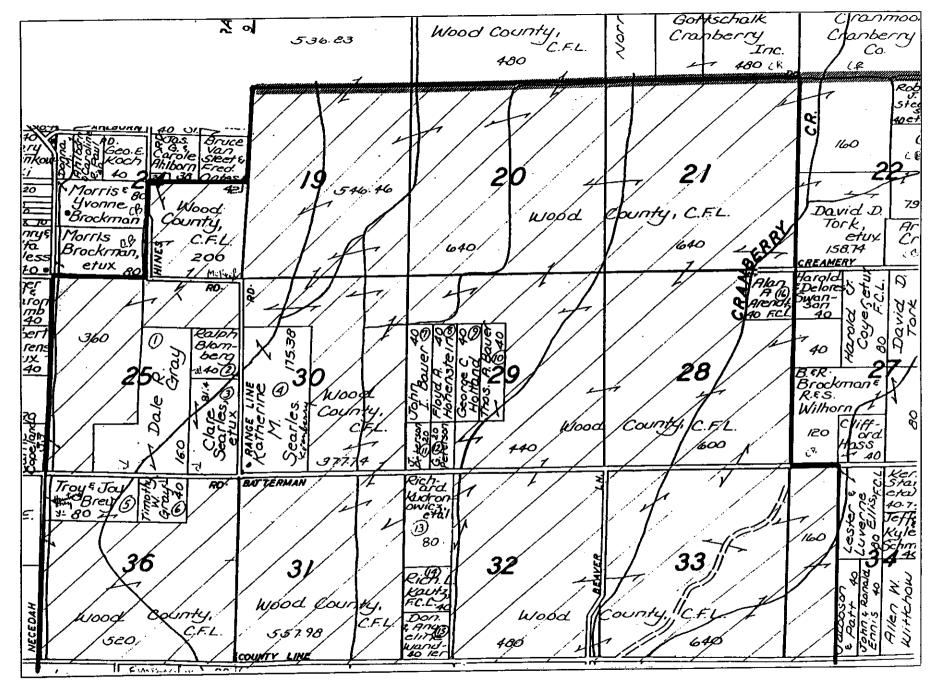


Figure A-1. Parcel Map of Proposed Expansion Area

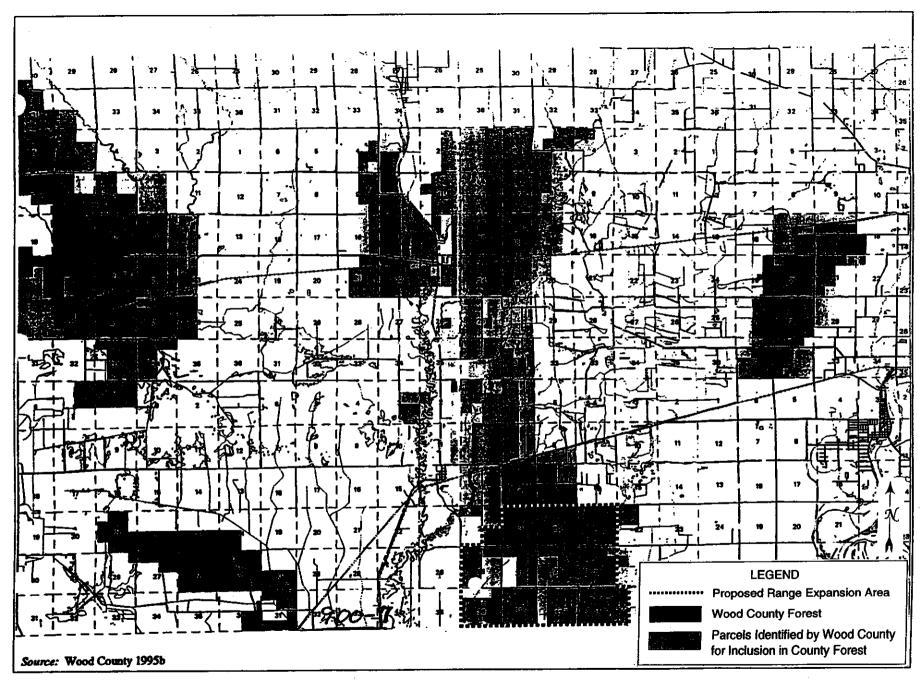


Figure A-2. Wood County Forest Ownership and Blocking Boundaries

# Table A-1 HARDWOOD BOMBING RANGE PROPOSED EXPANSION AREA WOOD COUNTY FOREST PROPERTY

## MERCHANTABLE TIMBER

| SPECIE           | <u>ASPEN</u>      | OAK             | R. PINE            | J. PINE | W. PINE         | HDWD.           | TOTAL        |
|------------------|-------------------|-----------------|--------------------|---------|-----------------|-----------------|--------------|
| ACRES            | 2006              | 1052            | 504                | 197     | 79              |                 | 3838 acres   |
| CORDS<br>\$/CORD | 16,819<br>\$18.25 | 10,170<br>59.01 | 11,531*<br>\$37.31 |         | 1627<br>\$31.11 | 4820<br>\$13.84 | 44,967 cords |
| TOTAL \$         | \$306,947         | \$91,632        | \$430,222          |         | \$50,616        | \$66,709        | 5946,126     |
| MBF**            |                   | 527.75          | 2,273.29           |         | 50.75           |                 | 2851.79      |
| \$/MBF           |                   | 590.00          | \$90.00            |         | \$90.00         |                 | MBF          |
| TOTAL \$         |                   | \$47,497        | \$204,596          |         | \$4,568         |                 | \$256,661    |
| GRAND<br>TOTAL   | <u>\$306,947</u>  | \$139,129       | \$634.818          |         | \$55,184        | <u>\$66.709</u> | \$1,202,787  |

## NON-MERCHANTABLE TIMBER

| SPECIE | <u>aspen</u> | <u>oak</u> | R. PINE | J. PINE | W. PINE | HDWD. | TOTAL      |
|--------|--------------|------------|---------|---------|---------|-------|------------|
| ACRES  | 1107         | 203        | 126     | 71      | 43      | 53    | 1603 acres |

## NON-FORESTED

| Lowlands (includes lowland brush, grass marshes, etc.) | 696 acres       |
|--|-----------------|
| uplands (includes upland brush and upland grass)       | <u>83 acres</u> |
| TOTAL ACRES  | 779 acres       |

Total land area from recon data within proposed range expansion area is 6220 acres

Price figures (per cord and per MBF) used to calculate timber values are weighted averages from Wood County's latest timber bid opening held in June 1997.

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<sup>\*</sup> Includes red and jack pine \*\* MBF = 1000 board feet

# APPENDIX J SENSITIVE LAND USE RESOURCES

# Appendix J

# Sensitive Land Use Receptors

| AIRSPACE<br>COMPONENT | LAND USE CATEGORY   | AREA NAME                                   |
|-----------------------|---------------------|---|
| Falls 1 and 2 MOAs    | Airport             | Augusta Landing Strip                       |
|                       |                     | Black River Falls Area Airfield             |
|                       |                     | Cunningham Airfield                         |
|                       |                     | Erickson Landing Field                      |
|                       |                     | Halverson Landing Field                     |
|                       |                     | Neillsville Municipal Airport               |
|                       |                     | Seig Landing Strip                          |
|                       |                     | Stephen Landing Strip                       |
|                       | County Park         | Coon Fork County Park                       |
|                       | Indian Reservation  | Winnebago Indian Reservation                |
|                       | State Fishery Area  | Big Creek State Fishery Area                |
|                       |                     | Buffalo River State Fishery Area            |
|                       |                     | North Branch Trempealeau State Fishery Area |
|                       |                     | Northfield Lake State Fishery Area          |
|                       | ·                   | Trump Lake State Fishery Area               |
|                       | State Forest        | Black River State Forest                    |
|                       | State Wildlife Area | Lakes Coulee State Wildlife Area            |
|                       |                     | Lowe Creek State Wildlife Area              |
|                       |                     | Tollefson Marsh State Wildlife Area         |
|                       |                     | Vosse Coulee State Wildlife Area            |
|                       |                     | West Taylor State Wildlife Area             |
|                       | Town                | Augusta                                     |
|                       |                     | Blair                                       |
|                       |                     | Fairchild                                   |
|                       |                     | Greenwood                                   |

# Appendix J

# Sensitive Land Use Receptors

| AIRSPACE<br>COMPONENT | LAND USE CATEGORY        | AREA NAME                          |
|-----------------------|--------------------------|------------------------------------|
| · ·                   |                          | Irving                             |
|                       |                          | Loyal                              |
|                       |                          | Melrose                            |
|                       |                          | Merrillan                          |
|                       |                          | Neillsville                        |
|                       |                          | Osseo                              |
|                       | Town/Hospital            | Black River Falls                  |
|                       |                          | Whitehall                          |
| Proposed R-6904       | County Forest            | Juneau County Forest               |
|                       |                          | Wood County Forest Crop Land       |
|                       |                          | Wood County Public Hunting Grounds |
|                       |                          | Wood County Wildlife Area          |
|                       | National Wildlife Refuge | Necedah National Wildlife Refuge   |
| Volk South MOA        | Airport                  | Dellaire Landing Strip             |
|                       |                          | Holiday Landing Strip              |
|                       | ·                        | Mesner Landing Strip               |
|                       |                          | Potter Landing Strip               |
|                       |                          | Necedah Airfield                   |
|                       |                          | Retzin Landing Strip               |
|                       | County Park              | Kennedy County Park                |
|                       | National Wildlife Area   | Necedah National Wildlife Area     |
|                       | State Park               | Buckhom State Park                 |
|                       | 1                        | Mill Bluff State Park              |
|                       | State Fishery Area       | Gilmore Creek State Fishery Area   |
|                       |                          | Mill Creek State Fishery Area      |

## Appendix J

## Sensitive Land Use Receptors

| AIRSPACE<br>COMPONENT | LAND USE CATEGORY   | AREA NAME                         |
|-----------------------|---------------------|-----------------------------------|
|                       |                     | White Creek State Fishery Area    |
|                       | State Wildlife Area | Meadow Valley State Wildlife Area |
|                       | Town                | Camp Douglas                      |
|                       |                     | Mauston (NE comer)                |
|                       | 1                   | Necedah                           |
|                       |                     | New Lisbon                        |
|                       | Town/Hospital       | Tomah                             |

# **APPENDIX K**

# LAND USE MANAGEMENT GUIDELINES FOR HARDWOOD RANGE

# FINAL LAND USE MANAGEMENT GUIDELINES HARDWOOD AIR-TO-SURFACE GUNNERY RANGE JUNEAU AND WOOD COUNTIES, WISCONSIN



# WISCONSIN AIR NATIONAL GUARD COMBAT READINESS TRAINING CENTER

Prepared For:

Air National Guard Andrews AFB, Maryland

December 1997

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# **ACRONYM LIST**

°F degrees Fahrenheit

ANGRC Air National Guard Readiness Center

ATV all terrain vehicle

CBE Council of Biological Editors

CEQ Council on Environmental Quality

CFR Code of Federal Regulations

CRTC Combat Readiness Training Center

CWA Clean Water Act

DoD Department of Defense

EIS Environmental Impact Statement

EO Executive Order

ESA Endangered Species Act

ILUMP Integrated Land Use Management Plan

mm millimeter

MOA Military Operations Area

MVAC Mississippi Valley Archaeological Center

NEPA National Environmental Policy Act

NHI Natural Heritage Inventory

NGB National Guard Bureau

NRCS Natural Resources Conservation Service

NWI National Wetlands Inventory

SCS United States Department of Agriculture Soil Conservation Service

SHSW State Historical Society of Wisconsin

SM statute miles

USACE United States Army Corps of Engineers

USEPA United States Environmental Protection Agency

USFWS United States Fish and Wildlife Service

WANG Wisconsin Air National Guard

WDNR Wisconsin Department of Natural Resources

WWI Wisconsin Wetland Inventory

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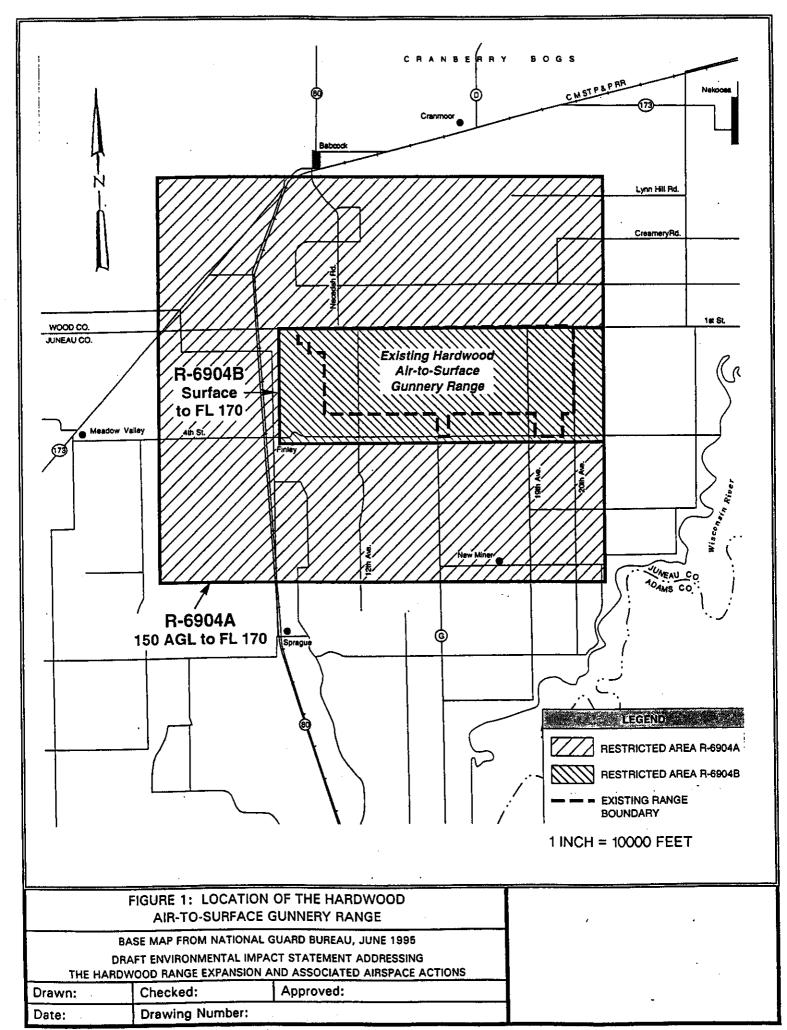
# 1.0 INTRODUCTION

The National Guard Bureau (NGB), through the Air National Guard Readiness Center (ANGRC), has proposed an expansion of the Hardwood Air-to Surface Gunnery Range (hereafter referred to as Hardwood Range) in Wisconsin by 7,137 acres. The proposal also includes modifications to existing restricted air space associated with the Hardwood Range. In order to accomplish this action, the NGB is required by the National Environmental Policy Act (NEPA) to complete an Environmental Impact Statement (EIS) that studies a range of alternatives including expansion and a No Action alternative.

The National Guard is also involved in planning and managing their land and water natural resource systems. These systems include grazing and croplands, forests, outdoor recreation, fish and wildlife, surface water, groundwater, and range activities. To accomplish this, an Integrated Land Use Management Plan (ILUMP) is required. Since the Hardwood Range expansion is only proposed at this time, it is not prudent or feasible to develop a comprehensive ILUMP. In this case, an abbreviated document, a Land Use Management Guidelines (hereafter referred to as Management Guidelines), was developed. The purpose of the Management Guidelines is to inform interested members of the public and government agencies of the types of goals and objectives for land management to be employed by the NGB should the Hardwood Range expansion occur. The function of the Management Guidelines is to provide the framework for natural resource activities at the site prior to acquisition and development of an ILUMP.

# 1.1 HARDWOOD RANGE

Hardwood Range is a Class A (manned) range that is used for day and night training. It is located north of Finley, Wisconsin (Figure 1). The area is leased from the State of Wisconsin. There is an easement between Juneau county and the State of Wisconsin. In the lease between the ANG and the State of Wisconsin, represented by the Adjutants General, the range personnel are able to occupy, maintain, use, and operate on lands needed for training activities. The land itself is owned by both the state and the county. Juneau County, in accordance with Section 28.10, Wisconsin Statutes., is able to authorize representatives of local, state, and Federal



government agencies the right to enter the property for the management of County Forest Areas, furtherance of Forest Crop Programs, and the management of hunting, fishing, and game on all land. This is providing that these practices will not in any way interfere, retard, restrict, or otherwise prevent the use of the land as an air-to-ground gunnery range.

# 1.1.1 Hardwood Range Mission

Operational testing of weapons systems and the training of combat personnel are the foundations upon which the Air Force builds, maintains, and ultimately achieves the readiness of operational forces. The Hardwood Range mission is training combat aircrews. Hardwood Range is planned, developed, maintained, and improved to provide a realistic environment for training. This environment provides the opportunity for aircrews and weapon systems to be employed in the same manner as they would in combat.

# 1.1.2 Hardwood Range Description and Existing Level of Use

Hardwood Range and the surrounding area are primarily forested, except for the target complex and scattered agricultural lands adjacent to the range. Hardwood Range is two statute miles (SM) wide by six SM long. A range building complex is located at the western edge of the range. The target complex, consisting of approximately 450 acres, is east of the range building complex and contains several tactical targets. Munitions employed at the Hardwood Range are all inert or practice ordnance. Bombs used include 25-pound practice bombs that contain a spotting charge, also 500- and 2,000-pound bombs that do not require spotting charges. Forward firing ordnance include 7.62 millimeter (mm) and 0.50 caliber machine gun and 20 mm and 30 mm cannon (all non-explosive).

Military units located within a usable operating distance of Volk Field, Wisconsin use the Hardwood Range to accomplish air-to-surface training and the associated Military Operations Areas (MOA) for air-to-air training. Volk Field Combat Readiness Training Center (CRTC) and the Wisconsin Air National Guard (WANG) are responsible for scheduling and managing the Hardwood Range.

### 1.2 HARDWOOD RANGE EXPANSION AREA

The proposed expansion area lies north of and adjacent to the Hardwood Range (Figure 2). The proposed expansion area consists of an expansion of the land area dedicated to the range. Within the expansion area, a new and larger target complex, an additional drop zone and an assault strip are proposed. The overall mission of the Hardwood Range would remain the same under the proposed action. The expansion would ultimately allow for more realistic forms of training including the use of different approaches to the range.

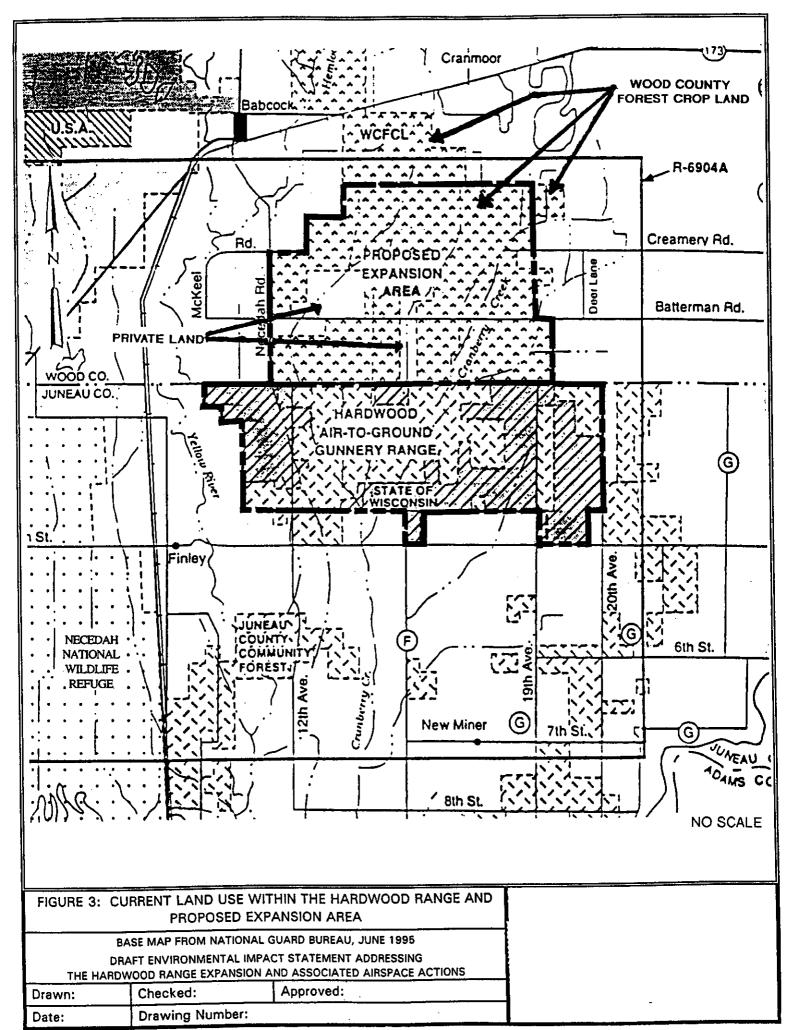
The proposed action would expand the land area of the range to the north by a total of 7,137 acres, of which 6,162 acres are currently county-owned and 975 acres are privately owned. Much of this area is sparsely inhabited and is used primarily for timber production and outdoor recreation (Figure 3). One cranberry bog is currently in operation within the proposed expansion area. The county lands are enrolled as County Forest lands and are managed as forest cropland.

# 1.3 CONTENT AND ORGANIZATION OF THE LAND USE MANAGEMENT GUIDELINES

The Management Guidelines provide: (1) information on the background of the Hardwood Range and proposed expansion area, including the regional setting and existing natural and cultural resources; and (2) a description of the general interim goals and objectives of management, management philosophy, development, protection and use of the natural and cultural resources.

This plan is organized as follows:

- Section 1 presents an introduction and background to the Hardwood Range and the proposed expansion area. This includes the mission of the Hardwood Range, purpose and organization of the Land Use Management Guidelines, and the relationship of the plan to other documents.
- Section 2 presents the regional climatic and geologic setting of the Hardwood Range and the proposed expansion area, and the existing condition of the soil resources, water



resources, fish and wildlife resources, forest resources, threatened and endangered species, outdoor recreation, and cultural resources at the Hardwood Range and proposed expansion area.

- Section 3 presents the land use management guidelines that includes planning assumptions and constraints; management goals and direction; and management guidelines and research needs for the natural and cultural resources.
- Section 4 lists the references used in the preparation of this document.

The reporting style of this plan generally follows the guidance of the Council of Biological Editors Style Manual (1983). The sources for scientific nomenclature are as follows: Gleason and Cronquist (1991) for plants; Vogt (1981) for reptiles and amphibians; Robins *et al.* (1967) for fishes; Robbins (1991) for birds; and Jones and Birney (1988) for mammals. The few invertebrates that are reported were species on the Natural Heritage Inventory (NHI) database of rare species. In these cases, the scientific names provided by NHI were used in this document. Wetlands were classified using the Wisconsin Wetland Inventory (WWI) nomenclature.

# 1.4 RELATIONSHIP OF THE MANAGEMENT GUIDELINES TO OTHER DOCUMENTS AND APPLICABLE OR RELEVANT AND APPROPRIATE REGULATIONS

If and when the proposed expansion proceeds, an ILUMP will be developed for the site. Completion of an ILUMP is a lengthy process that includes: identification of, and consultation with, cooperating agencies and interest groups; planning sessions aimed at goal setting, establishing an overall management philosophy, prioritization of management activities, and identification of funding sources; and finally, preparation and implementation of the plan. NGB will lead the development of the ILUMP and will assist in funding and initiating management activities at the site should the range expansion take place. This Management Guidelines document will provide interim guidance for management direction should the proposed expansion take place and before an ILUMP is completed. Many of the recommendations made

in this document will involve monitoring and surveying the site natural communities and resources to promote a better understanding of their structure and composition. In fact, biological surveys were completed during the summer of 1996. These interim activities will facilitate preparation of the ILUMP based on the higher level of knowledge of the site resources and their inter-relationships.

This is the first ANGRC document that presents management guidelines for the proposed expansion area. Should the expansion take place, this document will supersede existing county and state management plans that currently exist for these areas. However, additional management planning will be coordinated with county and state natural resource personnel.

This Management Guidelines document strives to satisfy various legal requirements and mandates. These include requirements to inventory and protect areas of environmental concern, as stated in one or more of the following pieces of legislation:

- Clean Water Act (CWA)
- Executive Order (EO) 11990, Protection of Wetlands (1977)
- EO 11988, Flood Plain Management
- Endangered Species Act (ESA) of 1973
- Historic Preservation Acts of 1966 and 1974
- Archaeological Resources Protection Act of 1979

Requirements for integrated natural resource management planning to achieve multiple-use and sustained yield are stated in the following:

- Multiple Use and Sustained Yield Act of 1960
- Federal Land Policy and Management Act of 1976
- 32 Code of Federal Regulations (CFR), Department of Defense (DoD) Natural Resources
   Management Program
- DoD Directive 4700.4, Natural Resources Management Program

### 2.0 EXISTING LAND USE AND NATURAL AND CULTURAL RESOURCES

This section describes the regional climate and geology of the Hardwood Range and proposed expansion area, and the existing land uses and natural and cultural resources present within the Hardwood Range and the proposed expansion area. These resources include: soil; water; fish and wildlife; forest; threatened, endangered and other special status species; outdoor recreation; and cultural.

#### 2.1 REGIONAL CLIMATE

The Hardwood Range area shows the wide range of temperatures and weather common to the temperate areas of the Eastern United States in general and the Great Lakes area in particular. Winters are cold and humid; summers are warm with moderate humidity. Periods of hot and humid weather (over 80 degrees Fahrenheit [°F] and 60 percent humidity) usually occur during the months of July and August and may last up to a week in duration. The daily average high temperature for a year is 55.9°F. The annual average daily low temperature is 36.9°F. The first frost occurs near October 16, and the last 32°F day occurs near April 25. Snow cover is usually present from late December/early January to late March/early April. The record low and high for the area are, -37°F in January 1951, and 103°F in August 1955, respectively.

For eight to nine months of the year, the dominant wind from the south brings moisture-laden air from the Gulf of Mexico to the Great Lakes area. As a result, precipitation for this area comes primarily from the Gulf of Mexico. During the summer months two mechanisms are at work for precipitation in the area. The first, normal rainstorms, produce a gentle rainfall over a large region lasting up to several days. The second type of storm, a thermal storm, occurs during the hotter days of summer. These storms are brief, intense, and localized. They usually occur in the late afternoon or early evening. During winter months snow often results from the meeting of moist Gulf air and cold arctic air. The yearly average precipitation in the area is 32.66 inches.

# 2.2 REGIONAL GEOLOGY

The basement rock of this area consists of a crystallized magma injected during the Precambrian era. Other examples of this type of rock can be found in Northern Wisconsin and the Canadian Shield.

During the Cambrian Period (570 to 505 million years ago), a shallow sea covered the area of present-day Wisconsin. This time period was before the evolution of land plants. Sediments eroded from the Canadian Arch were swiftly transported to shallow seas and deposited. The sea retreated and advanced across the land numerous times. Sandstones were eroded back to sand and these sands were compacted and re-lithified to sandstone. Because of this long cycle of reworking, only the most resistant minerals were left and when final burial occurred, the sands were quartz-rich. These sands were compressed and lithified into the present day sandstone bluffs of the area. In the geologic record, a gap of 500 million years to 540 million years occurs after the Cambrian Period. On the recent side of the gap is the last ice age that occurred from 110,000 to 10,000 years ago.

During the last ice advance (Wisconsin Age), the Hardwood Range was part of the Driftless Area, an area not covered by the continental ice sheet. Even so, the area was heavily influenced by the ice sheet. The Green Bay lobe of the glacier covered the eastern third of the state, creating a massive ice dam to the east of the base and causing a large glacial lake to form. This lake, Glacial Lake Wisconsin, covered parts of Adams, Columbia, Juneau, Marquette, Monroe, Portage, Sauk, Waushara, and Wood counties and existed for thousands of years. Hardwood Range was part of Glacial Lake Wisconsin and shows features related to this geological feature. Hardwood Range was located near the outlet of the ancient lake into the East Fork Black River. At this location, the river channel and its currents extended far back into the lake. As a result, river features melded with lake features and produced the characteristics of the present-day Hardwood Range area. For example, channel cuts normally associated with river systems were present in the outlet portion of the lake. The area also shows such features as gravel beds that become finer and grade into sands, repeating the pattern in classic cross-bedding such as is seen in the Friendship Sands of the area. Density currents (moving slurries of mud and water) deposited thick layers of sand in the lake while the finer particles were swept downriver by

currents before they could settle out of the water. Rock fragments in the glacier were either carried out by glacial meltwater or blown from the glacier by strong winds from the interior of the ice sheet. All these sediments came to rest on the bottom of this ancient lake, forming a layer that was several hundred feet thick in areas. The "Central Sands of Wisconsin" found in the area today are a relict feature of this prehistoric lake. Present-day soils lie on sediments that were deposited in the basin of Glacial Lake Wisconsin. The climate of the area during the last ice age resembled the arctic conditions of portions of present-day Alaska and northern Canada. Under these climatic conditions, the sandstone formations from earlier times were shattered by ice and reduced to sand by yearly freeze-thaw cycles.

As the climate warmed, the glacier began to melt and its margins retreated. With this warming, the ice dam that formed Glacial Lake Wisconsin rotted. Current theory is that the ice dam failed catastrophically and the entire lake changed its drainage from the northeast outlet of the East Fork Black River, to the southeast. Drainage of the entire lake is hypothesized to have happened in two to four days. The slurry of water and sand acted as a sand-blaster, carving the lower part of the cliffs in the present day Wisconsin Dells. The dominant south-southeast drainage of today's rivers in this area is the result of the channels cut during the rapid draining of this prehistoric lake.

#### 2.3 SOIL RESOURCES

The soils of the Hardwood Range and proposed expansion area are derived from course to fine sands, silt and clay deposited by glacial meltwaters along the Wisconsin River or in Glacial Lake Wisconsin. Soil particles were derived both from the erosion of the Cambrian sandstone formations and from rock fragments carried in the glacier. Both of these were deposited by wind and water into the basin of the prehistoric lake. As previously discussed, the quartz-rich sands were derived from the Cambrian sandstone re-worked several times as the sea rose and fell during that era, eventually compacting and lithifying into the present-day sandstone bluffs.

In addition, the glacier carried rock fragments from the north that served as parent materials for the eventual formation of soils. These parent materials were carried down from the Canadian Shield, Baraboo Quartize, and rock formations or soils classified between these two. The rock fragments were melted out of or blown off the glacier and into an ice-cold lake. In the severe cold of prehistoric weather conditions, chemical reactions were very slow to non-existent. Concomitantly, the evolution of soils, which relies on chemical and biological processes, was also extremely slow in these near-arctic conditions. Rock fragments could only be shattered into finer and finer particles by the mechanical processes resulting from ice and cold, with the particles being washed or blown into Glacial Lake Wisconsin.

Most of the available soil information for the Hardwood Range area is found in the Wood County and Juneau County Soil Surveys. Because the names, descriptions, and the accuracy, precision, and resolution of soil delineations change and/or are updated, the soil survey for one county does not always agree or join fully with soil maps of adjoining counties. Since the Soil Survey of Juneau County, Wisconsin (United States Department of Agriculture, Soil Conservation Service [SCS] 1991) is more up-to-date than the Wood County survey, this document reflects the mapping, classification and nomenclature represented for Juneau County.

#### 2.3.1 Soil Associations

A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and is named for the major soils. The soils in one association may occur in another, but in a different pattern.

The Hardwood Range and the proposed expansion area lie within a larger area that is identified as Newson-Meehan and Newson-Meehan-Dawson associations. These associations consist of nearly level, poorly drained and somewhat poorly drained soils that have a sandy subsoil. The component soils were formed in deep sandy outwash on sandy outwash plains and glacial lake deposits. Newson soils comprise about 46 percent of the association, Meehan soils about 28 percent, Dawson soils about 13 percent, and minor soils comprise the remainder.

Newson soils are in depressions on sand plains. Meehan soils are on low rises on sand plains. Dawson soils are on low flats and in drainageways and depressions on sand plains, stream terraces, and in glacial lake beds. Although there are several minor soils in this association, the

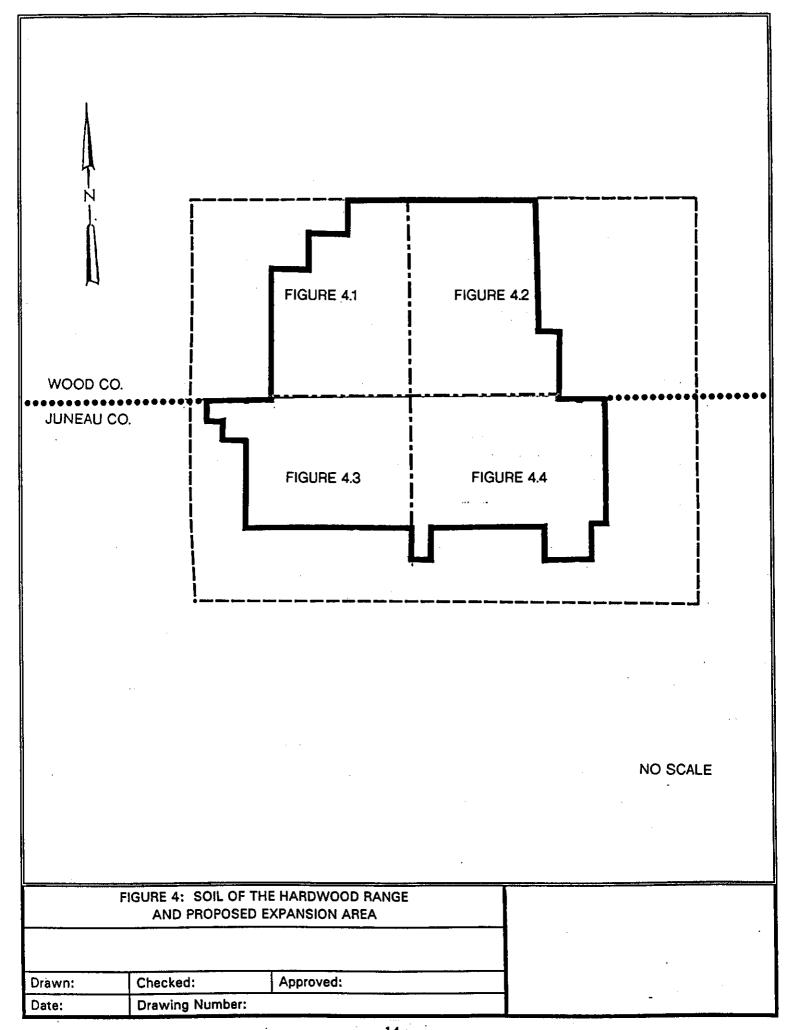
most common in the Hardwood Range and proposed expansion area is the Friendship series. Friendship soils are on low hills on outwash plains.

If soils of these associations are cultivated, the hazard of blowing is severe. Wetness is a moderate to severe limitation. Most of this association is in woodland cover. Most of the areas that were formerly cultivated have been planted to trees or have reverted to woodland. Only a few small areas remain cultivated due to the low productivity associated with these soils. The Newson soils are well suited for cranberry production.

# 2.3.2 Soil Series and Mapping Units

Soils that have profiles almost alike make up a soil series. All the soils in a series have major horizons that are similar in thickness, arrangement, and other characteristics. However, because soils of one series can differ in texture of the surface layer, slope, and/or stoniness, for example, soil series are further divided into phases. Soil mapping units, those soils delineated in the county soil survey, are nearly equivalent to soil phases. Soil maps for the Hardwood Range and the proposed expansion area are included in Figure 4. The following are brief descriptions of the soil series, phases, and mapping units that are delineated for the Hardwood Range and the proposed expansion area.

• FrA, FsB - Friendship loamy sand, 1 to 6 percent slopes. This unit consists of deep, nearly level, moderately well drained sandy soils found on outwash plains. These soils formed under jack pine (Pinus banksiana) - black oak (Quercus velutina) forests and barrens. The seasonal high water table is at a depth of 3 to 5 feet during part of the year. Natural fertility of these soils is low and the hazard of soil blowing is severe on cultivated fields. Most of the acreage of these soils are in woodland, but some areas are used for crops and native pasture. The seasonal high water table moderately limits these areas as building sites with onsite sewage disposal.



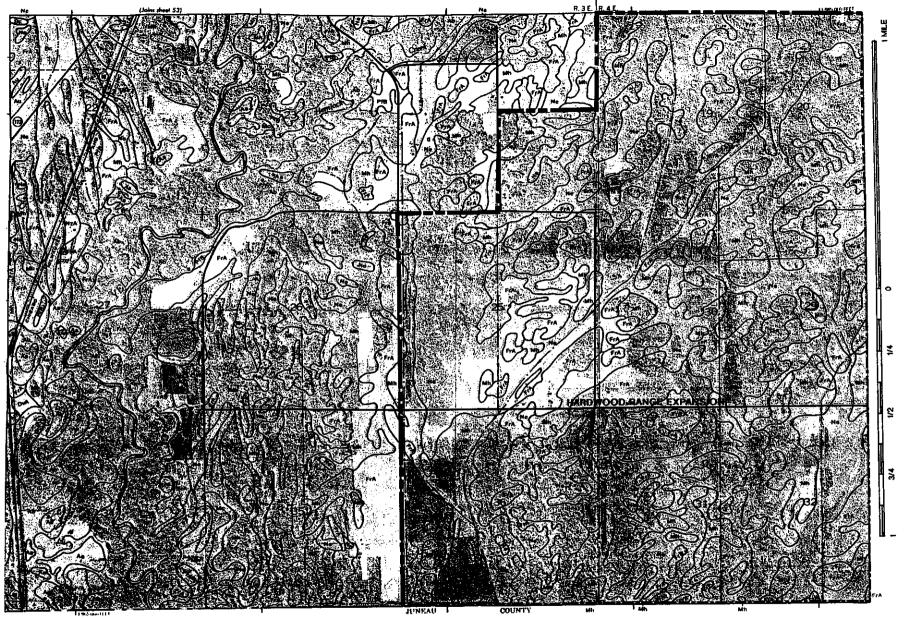
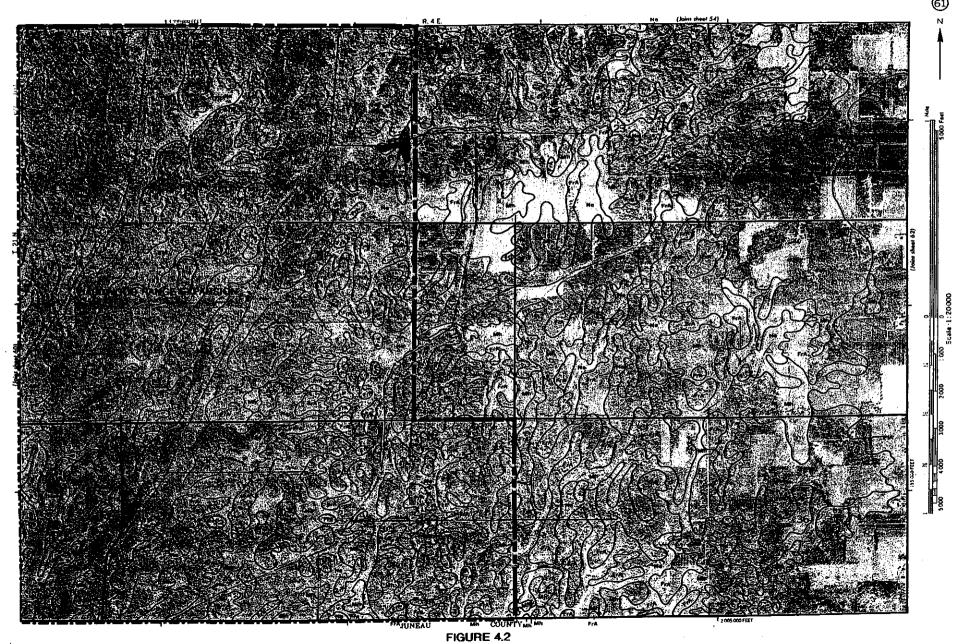
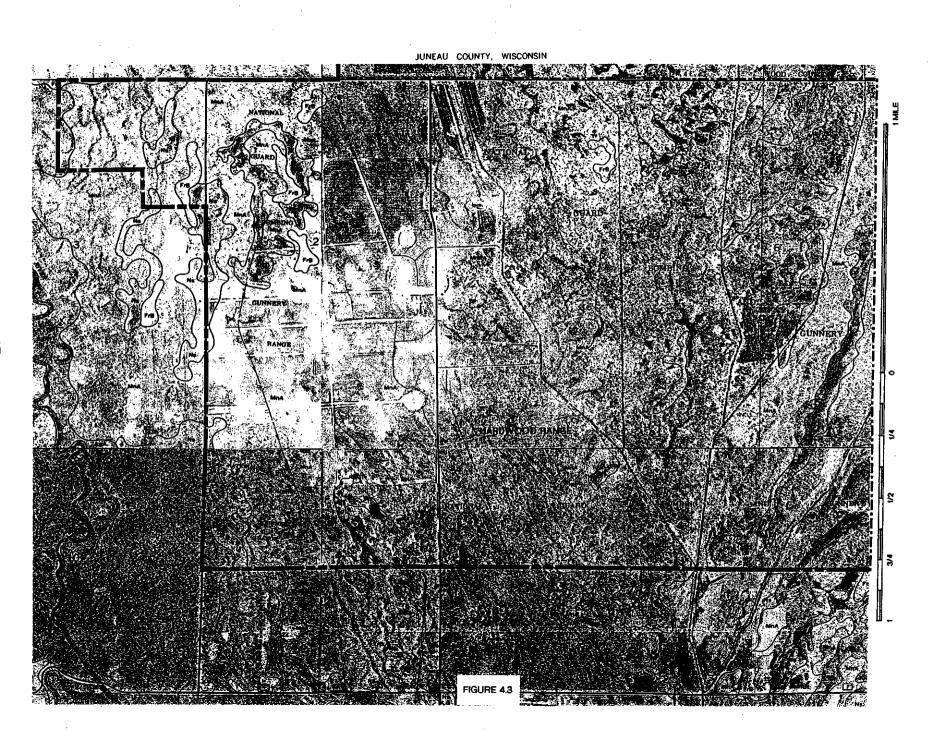


FIGURE 4.1







- FrB Friendship sand, 1 to 6 percent slopes. This unit consists of deep, nearly level to gently sloping, moderately well-drained soil found on flats, stream terraces, outwash plains and basins of glacial lakes. These soils formed under jack pine black oak forests and barrens. The seasonal high water table is at a depth of 2.5 to 6 feet below the surface during wet periods. Natural fertility of these soils is low and the hazard of soil blowing is severe on cultivated fields. Most of the acreage of these soils have been cultivated in the past but have since reverted to native cover or been planted in coniferous trees (Pinus and Picea spp.). The seasonal high water table moderately limits these areas as building sites with onsite sewage disposal.
- Mh Meehan loamy sand, 0 to 2 percent slopes. This unit consists of deep, somewhat poorly drained sandy soils found in depressions on outwash plains or on low rises surrounded by poorly drained sandy soils. These soils formed in deep sandy sediment under mixed coniferous and hardwood forest. The seasonal high water table is at a depth of one to three feet during wet periods. Natural fertility of these soils is low and the hazard of soil blowing is severe on cultivated fields. Most of the acreage of these soils is in second-growth hardwood forest or in pine plantations, however, some areas are still used for crops. The seasonal high water table severely limits these areas as building sites with onsite sewage disposal. Newson soils are often present as inclusions in topographic depressions. The Newson inclusions are listed as a hydric (wetland) soil by the Natural Resources Conservation Service (NRCS) (formerly SCS).
- MnA Meehan-Newson complex, 0 to 3 percent slopes. This soil complex consists of nearly level to gently sloping, deep, and somewhat to very poorly drained soils. These two soils often occur as areas so intricately intermingled or so small that mapping them separately is not practical. Each of these soils are described elsewhere in this section. The Newson soil component of this complex is listed as a hydric (wetland) soil by the NRCS.

- Ne Newson mucky loamy sand, 0 to 2 percent slopes. This unit consists of deep, poorly drained sandy soils in depressions on outwash plains. These soils formed in deep sandy sediment under lowland hardwood sedge (Carex spp.) cover. The seasonal high water table is at or near the surface during spring and early summer. Natural fertility of these soils is low. If drained, this soil is subject to a severe hazard of soil blowing. Most of the acreage of these soils is in low-quality woodland. Some areas were cleared and cropped historically, however, most are now abandoned and have reverted to woodland. These areas are well suited for cranberry production. The seasonal high water table very severely limits these areas as building sites with onsite sewage disposal. This soil is listed as a hydric (wetland) soil by the NRCS.
- Ns Newson-Dawson complex, 0 to 2 percent slopes. This soil complex consists of deep, nearly level soils that are formed on drainageways and depressions of glacial outwash plains, on stream terraces and in the basins of glacial lakes. These two soils often occur as areas so intricately intermingled or so small that mapping them separately is not practical. The Newson series was described above. The Dawson soils formed under herbaceous and woody shrub wetland plants. The water table is at or near the soil surface for much of the growing season. Most of the acreage of Dawson soils is in native herbaceous vegetation. Some areas were probably drained and farmed or pastured in the past, but have since reverted to wetlands. The water table very severely limits these areas as building sites with onsite sewage disposal. This soil complex is listed as a hydric (wetland) soil by the NRCS.
- PfB Plainfield sand, 1 to 6 percent slopes. This unit consists of deep, nearly level to gently sloping, excessively drained soils found on flats, side slopes on outwash plains, stream terraces, uplands, and basins of glacial lakes. These soils formed under jack pine oak (Quercus spp.) forests and barrens and under grasses (Graminae). The seasonal high water table is below five feet deep. Natural fertility of these soils is low. If cleared, this soil is subject to very severe hazard of soil blowing and slight hazard of water erosion.

Most of the acreage of this soil is in woodland. This soil can have moderate to severe limitations as buildings sites with onsite sewage disposal.

### 2.4 WATER RESOURCES

Hardwood Range lies within the southern portion of the central Wisconsin River basin. The central Wisconsin River basin is in the middle part of the entire Wisconsin River basin. The central Wisconsin River basin is about 5,050 square miles in area and is contained entirely within Wisconsin. This basin extends from Merrill south to the Wisconsin Dells. This basin consists of a gently sloping plain of outwash and lake deposits over outwash. The area around the Hardwood Range and proposed expansion area has extensive wetlands, which result from flat topography, high water table, and impermeable layers of silt and clay within the lake deposits. The gently sloping nature of the area is disrupted by several small buttes or mounds of bedrock projecting above the plain. An example of such a mound is Cranberry Rock, along the eastern edge of the Hardwood Range.

Most of the surface water drainage in the central Wisconsin River basin is to the Wisconsin River. However, along the eastern and northeastern borders of the basin some of the surface drainage is into small lakes and marshes that lack surface outlets. The total relief in the basin is 1,100 feet: from 840 feet at the Wisconsin Dells to 1,940 feet at the top of Rib Mountain near Wausau.

### 2.4.1 Streams, Rivers and Floodplains

Hardwood Range and the proposed expansion area are within the drainage of the Yellow River which joins the Wisconsin River approximately 25 miles south of Hardwood Range. Locally, Cranberry Creek and many small tributaries and drainage ditches carry surface and groundwater from the range, the proposed expansion area, and areas directly north. Many of the drainage ditches appear to be navigable waterways. In the area of the Hardwood Range and the proposed expansion area, surface water is used primarily for recreation, wildlife and fish production, and cranberry production. Necedah is the only town downstream of the range, 13 miles south and along the Yellow River.

Much of the Hardwood Range and proposed expansion area lie within the 100-year flood plain that is associated with Cranberry Creek and its many tributaries and connecting drainage ditches (Figure 5).

#### 2.4.2 Wetlands

Wetlands are defined by the United States Army Corps of Engineers (USACE) and the United States Environmental Protection Agency (USEPA) as:

Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (Federal Register 1980; 1982).

Wetlands are recognized as providing important biological, chemical, and physical functions and values. Biological function and values include providing wildlife and fisheries habitat and maintenance of floral diversity. Chemical function and values include treatment of surface water runoff before it enters groundwater or another surface water body and contribution to atmospheric nitrogen, sulfur, carbon dioxide, and methane levels. Physical functions include attenuation of flood flows and groundwater recharge.

Extensive wetlands are found within the Hardwood Range and proposed expansion area. These wetlands are primarily forested and shrub/scrub wetlands that occupy historic drainageways to Cranberry Creek and other Yellow River tributaries. Many of the forested and shrub wetlands contain smaller areas of emergent/wet meadow wetlands on the more poorly-drained soils or exist as a complex of more than two wetland types. Table 1 lists the major wetland types found within the Hardwood Range and the proposed expansion area according to the WWI. WWI maps of the Hardwood Range and proposed expansion area are included in Figures 6.1 - 6.4.



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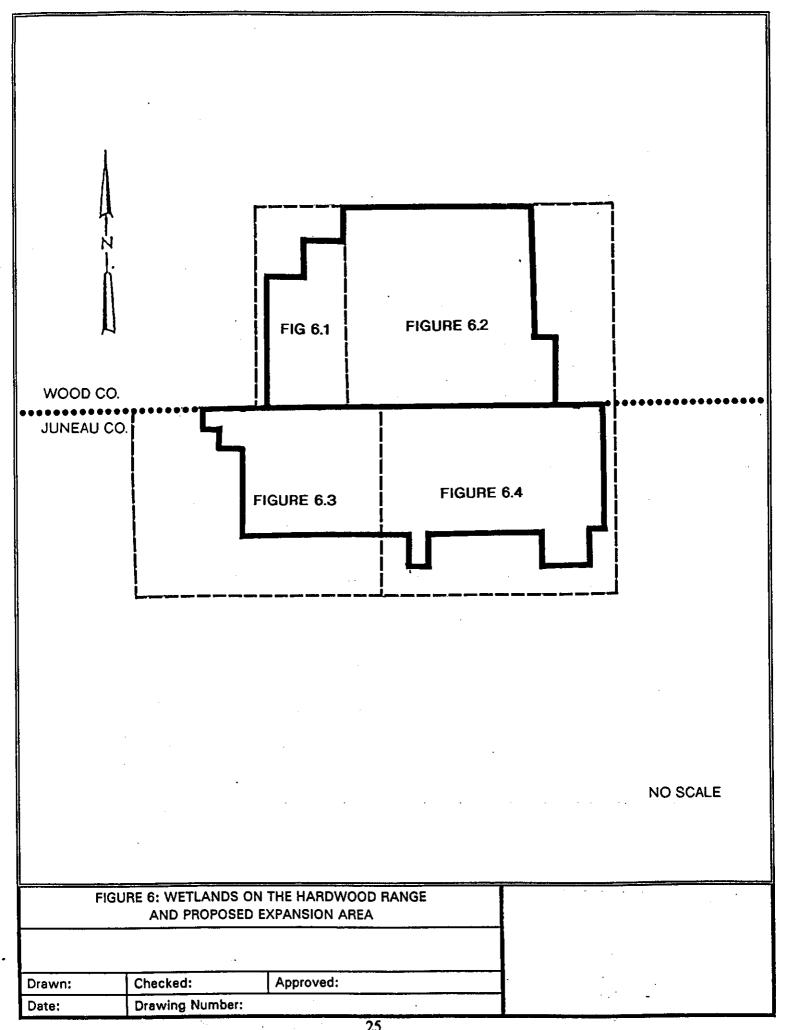


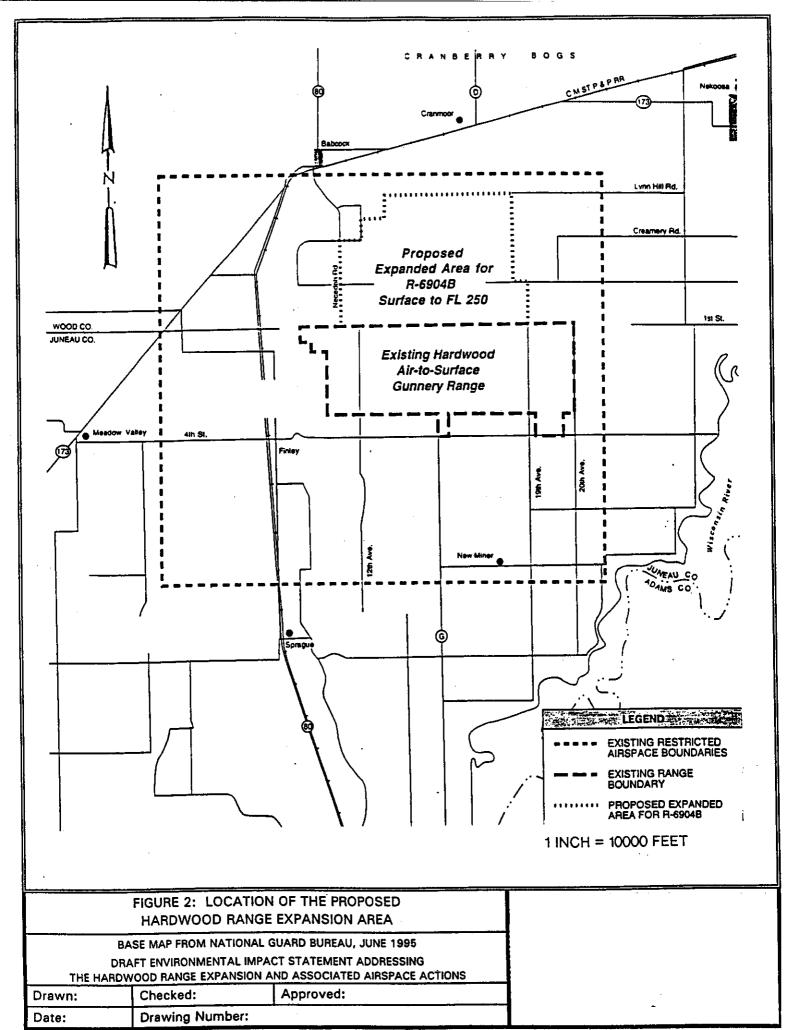
Table 1
Classification of Wetlands Found Within the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin.

| WWI                           |   | Plant Community                             |
|-------------------------------|---|---|
| Classification <sup>a,b</sup> | Description   | Type (Curtis 1959)                          |
| E1K                           | Emergent/wet meadow, narrow or broad-leaved persistent, wet soil, palustrine                              | Wet prairie, wet<br>meadow, sedge<br>meadow |
| E1Kv                          | Emergent/wet meadow, narrow or broad-leaved persistent, wet soil, palustrine, vegetation recently removed | Wet prairie, wet<br>meadow, sedge<br>meadow |
| E2K                           | Emergent/wet meadow, narrow-leaved persistent, standing water, palustrine                                 | Emergent aquatic                            |
| E1H                           | Emergent/wet meadow, narrow or broad-leaved persistent, standing water, palustrine                        | Emergent aquatic                            |
| Е2На                          | Emergent/wet meadow, narrow or broad-leaved persistent, standing water, palustrine, abandoned farmland    | Emergent aquatic                            |
| S3H                           | Shrub/scrub, broad-leaved deciduous, standing water, palustrine   | Shrub-carr                                  |
| S3Hv                          | Shrub/scrub, broad-leaved deciduous, standing water, palustrine, vegetation recently removed              | Shrub-carr                                  |
| S3K                           | Shrub/scrub, broad-leaved deciduous, wet soil, palustrine   | Shrub-carr                                  |
| Т3Н                           | Forested, broad-leaved deciduous, standing water, palustrine  | Wet forest                                  |
| T3K                           | Forested, broad-leaved deciduous, wet soil, palustrine  | Wet forest                                  |
| T3Kv                          | Forested, broad-leaved deciduous, wet soil, palustrine, vegetation recently removed                       | Wet forest                                  |
| T5K                           | Forested, needle-leaved evergreen, wet soil, palustrine   | Wet forest                                  |
| WØH.                          | Open water, subclass unknown  | None  |

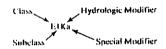
Notes: a Wisconsin Wetland Inventory (WWI).

<sup>&</sup>lt;sup>b</sup> Wetlands frequently occur in a complex of two or more types. For example, an area denoted as T3/E1K wetland consists of forested and wet meadow areas intermixed.





#### LEGEND



#### Class and subclass

- A Aquatic bed
  - 1 Submergent
  - 2 Floating
  - 3 Rooted floating
  - 4 Free floating

#### M Moss

- E Emergeni/wei meadow
  - 1 Persistent
  - 2 Narrow-leaved persistent
  - Broad-leaved persistent
  - 4 Nonpersistent
  - Narrow-leaved nonpersistent
  - Broad-leaved nonpersistent
- 5 Scrub/shrub
  - 1 Deciduous
  - 2 Needle-leaved deciduous
  - Broad-leaved deciduous
  - 4 Evergreen
  - 5 Needle-leaved evergreen
  - 6 Broad-leaved evergreen
  - 7 Dead
  - # Needle-leaved
  - 9 Broad-leaved
- T Forested
  - i Deciduous
  - 2 Needle-leaved deciduous
  - 3 Broad-leaved deciduous
  - 5 Needle-leaved evergreen
  - 7 Dead
  - 8 Needle-leaved
- F Flats/unvegetated wet soil
  - # Subclass unknown
  - 1 Cobble/gravel
  - 2 Sand
  - 3 Mud
  - 4 Organic
  - 5 Vegetated pioneer
- Open water
- **Ø** Subclass unknown
- 1 Cobble/gravel
- 2 Sand
- 3 Mud
- 4 Organic

#### Hydrologic modifier

- 1. Standing water, Lake
- R Flowing water, River
- H Standing water, Palustrine
- K Wet soil, Palustrine

#### Special modifiers

- Abandoned cropland
- Man-made cranberry bog
- Exposed flats complex
- Farmed in dry years
- Grazed
- Central sands complex
- Floating vegetated mats
- Ridge and swale complex
- Vegetation recently removed
- Floodplain complex
- Excavated
- Red clay complex

#### Map symbols

Upland surrounded by wetland Wetland - upland boundary

- Weiland deep water lake Level ditch
- Stream or drainage ditch
- Railroad
  - Dike, levee, abandoned railroad Same classification on both
  - sides of linear feature
- Wetland smaller than 2 acres
- Dammed pond smaller than
- 2 acres Excavated pond smaller than
- 2 acres Man-made dam Spring within a wetland Beaver dam
- Manicipal houndaries County boundary
- Township houndary Area no longer werland; field verified

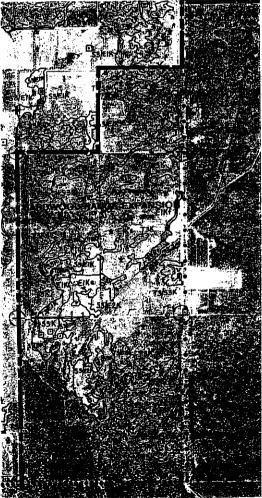
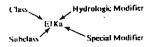


FIGURE 6.1

2000

2000 FEET

#### LEGEND



#### Class and subclass

A Aquatic bed 1 Submergent

2 Floating

3 Rooted Boating

4 Free floating

M Moss

E. Emergent/wet meadow

1 Persistent

2 Narrow-leaved persistent

3 Broad-leaved persistent

4 Nonpersistent

5 Narrow-leaved nonpersistent 6 Broad-leaved nonpersistent

S Scrub/shrub

1 Deciduous

2 Needle-leaved deciduous 3 Broad-leaved deciduous

4 Evergreen

5 Needle-leaved evergreen 6 Broad-leaved evergreen

7 Dead

8 Needle-leaved

9 Broad-leaved

T Forested i Deciduous

2 Needle-leaved deciduous

3 Broad-leaved deciduous 5 Needle-leaved evergreen

7 Dead

8 Needle-leaved

F Flats/unvegetated wet soil

# Subclass unknows

I Cobble/gravel

2 Şand 3 Mud

4 Organic

5 Vegetated pioneer

W Open water

Subclass unknown

1 Cobble/gravel

2 Sand

3 Mud

4 Organic

#### Hydrologic modifier

Standing water, Lake
 Flowing water, River
 Standing water, Palustrine

K Wet soil, Palustrine

#### Special modifiers

Abandoned cropland

e Exposed flats complex

Farmed in dry years

Grazed

Central sands complex

m Floating vegetated mais

Ridge and swale complex Vegetation recently removed

w Floodplain complex

Excavated

Red clay complex

#### Map symbols

Upland surrounded by wetland
Wetland — upland boundary
Wetland — deep water lake
f.evel ditch
Siream or drainage ditch
Road
Railroad
Dike, levee, abandoned railroad
Same classification on both
sides of linear feature
Wetland smaller than
2 acres
Dummed pond smaller than
2 acres

Executed pond smaller than
2 acres
Man-made dam
Spring within a wetland
Beaver dam

Municipal boundaries
 County boundary
 Township boundary

Area no longer werland; field verified

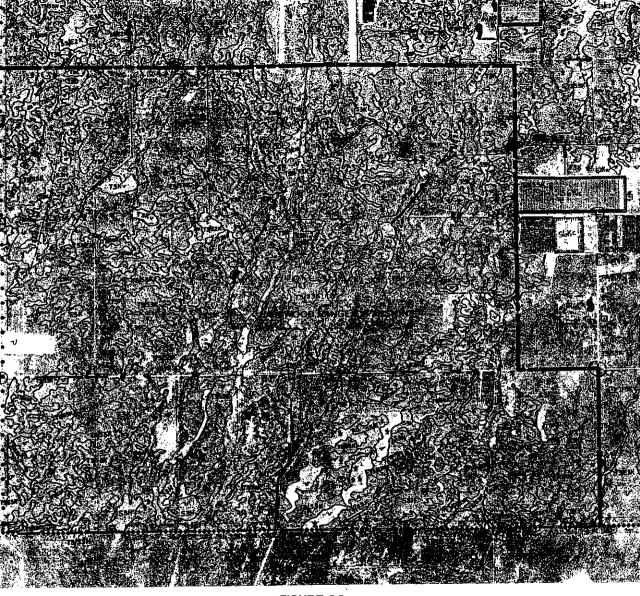
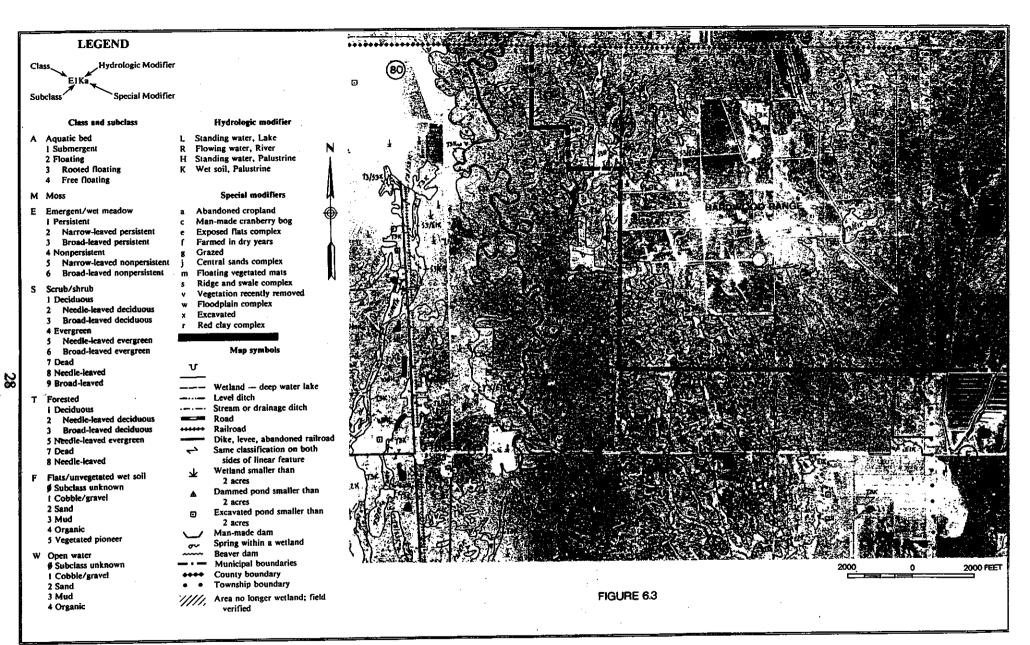
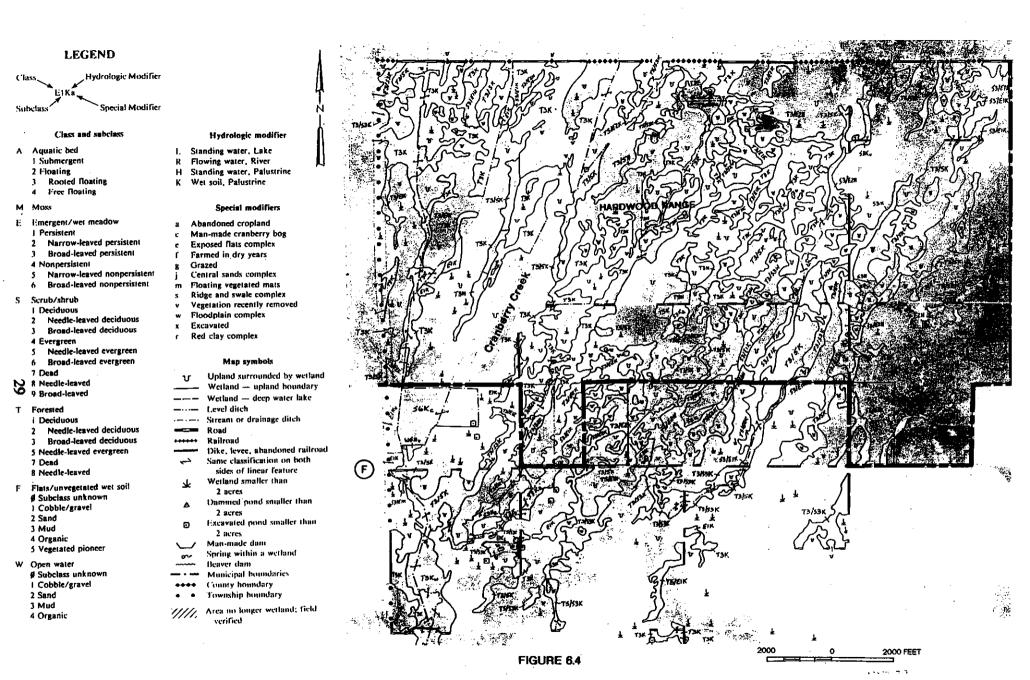


FIGURE 6.2

2000 0 2000 FEET





#### 2.5 FISH AND WILDLIFE RESOURCES

The Hardwood Range and the proposed expansion area are located within what is referred to as the *tension zone* — a vegetational transition area lying between the prairie-forest province in the southwest portion of the state and the northern hardwoods province in the northeast (Curtis 1959). This transition zone, or ecotone, contains a blending of plant species from both provinces with southern species approaching their northern range limits and northern species approaching their southern limits.

A map of vegetation at the time of European settlement (Finley 1976) shows the region of Hardwood Range to be on a boundary between the northeast conifer-hardwood forest province and the southwest prairie-oak grove-savanna province. The map depicts the western and southern edges of Hardwood Range and the western edge of the proposed expansion area as jack pine and Hill's (northern pin) oak (*Quercus ellipsoidalis*) forests and barrens; the northern portion of the expansion area as swamp conifer - white cedar (*Thuja occidentalis*), black spruce (*Picea mariana*), tamarack (*Larix laricina*), and hemlock (*Tsuga canadensis*); and the remaining area as wetlands consisting of marsh and sedge meadow, wet prairie, and lowland shrubs.

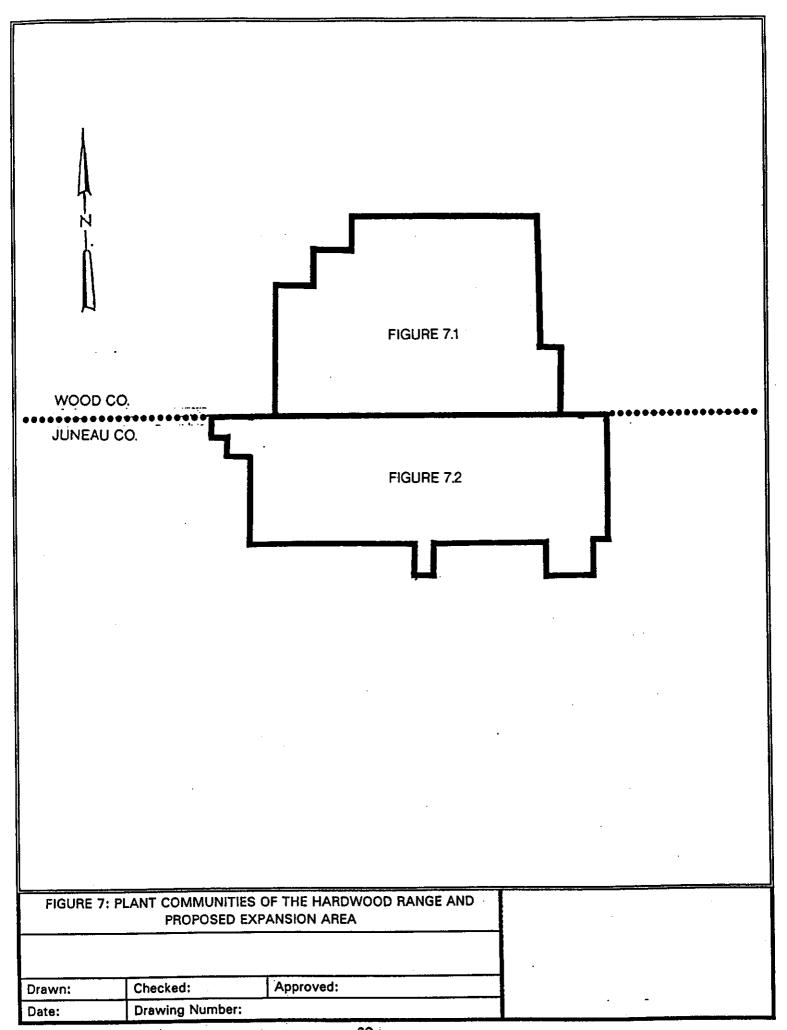
Jackson (1961) documents a similar transitional phenomenon for mammal species in his recognition of a Transition Life Zone occurring mid-state, with the Canadian Life Zone to the north and the Upper Austral Life Zone to the south. In yet another representation of the transitional nature of the region, Robbins (1991) superimposed Curtis' tension zone on five geographical provinces of Martin (1932) to develop eight avifaunal areas. Hardwood Range lies on the border between the "Central Sand Plain" to the south and the "Tension Zone West and Central" to the north, the latter zone typified by deciduous forests of aspen (Populus spp.), birch (Betula spp.), red and white oaks (Quercus rubra and Q. alba), red maple (Acer rubrum) and sugar maple (Acer saccharum) interspersed with extensive dairy farm clearings. The reader is referred to Robbins (1991) for maps and more complete descriptions of these areas. It is sufficient for the purposes of this document to merely point out the varied ways in which the transitional nature of this region has been documented and characterized.

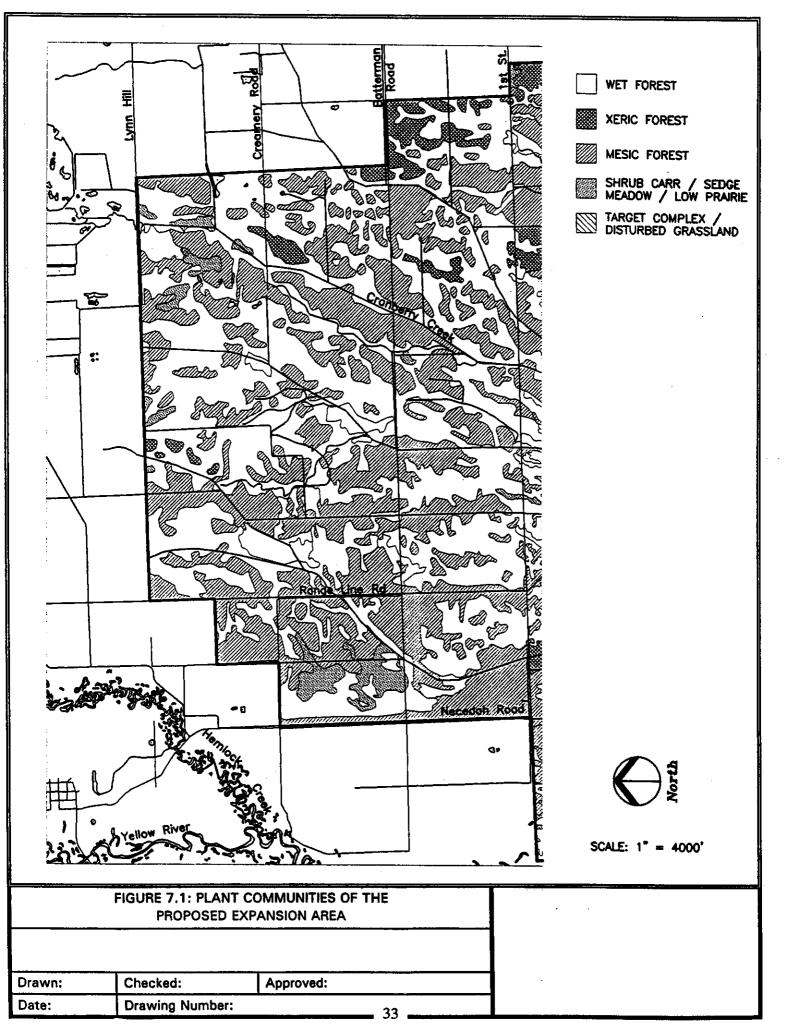
Hardwood Range is north and east of a hilly area known as the Driftless Area. As evidenced by its buttes and mesas, the Driftless Area escaped glaciation during the Wisconsin Age although it very likely was glaciated in earlier, more extensive ages such as the Illinoian, Kansan, and Nebraskan (Zumberge and Nelson 1972). This area is widely believed to have functioned as a refugium for many species during the Wisconsin Age, subsequently serving as a population source for recolonization of glaciated regions (Vogt 1981). Species with western affinities from the Great Plains entered Wisconsin during a dry, warm period (xerothermic) that followed the post-glacial climatic optimum period. Many of these persist today as relict populations, disjunct from their main population. Examples of amphibian and reptile species with western affinities, potentially present in the Hardwood Range area, include tiger salamander (Ambystoma tigrinum), Cope's gray treefrog (Hyla chrysoscelis), and western slender glass lizard (Ophisaurus attenuatus) (Vogt 1981).

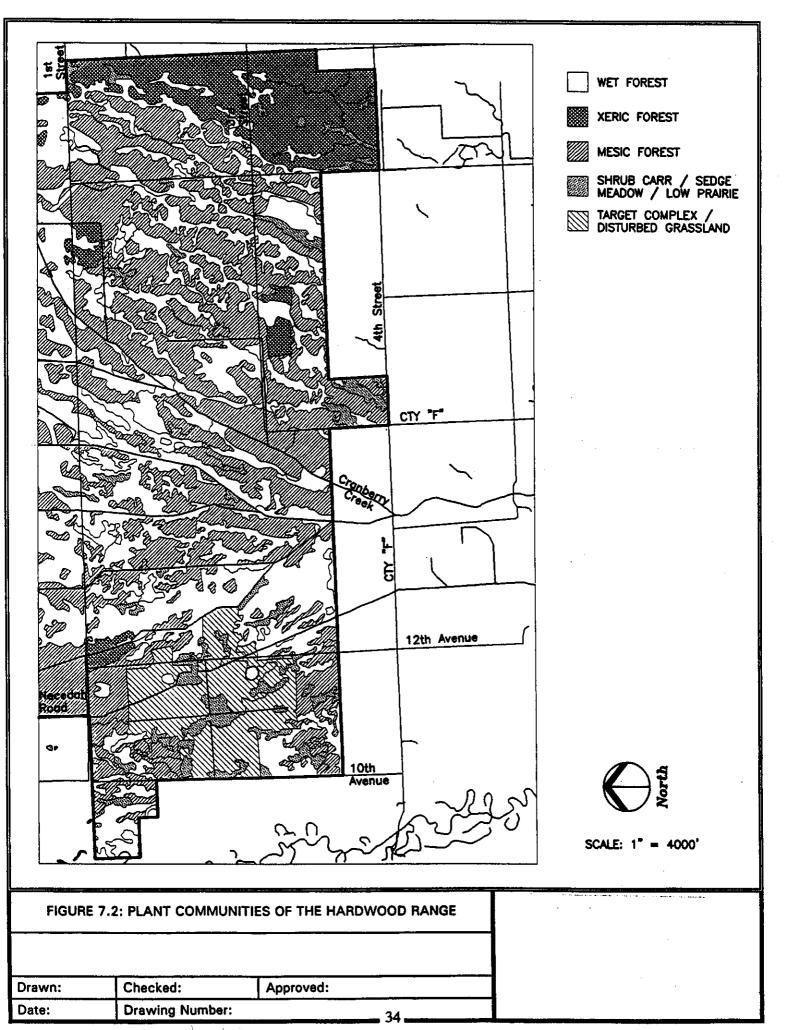
The Hardwood Range area is drained by streams and rivers that flow into the Wisconsin River within Juneau County and thereby become part of the Mississippi River watershed. These water systems undoubtedly contribute to the actual and potential biological diversity of the Hardwood Range. Hardwood Range is drained directly by tributaries of the Yellow River as well as numerous drainage ditches. Such rivers, creeks, and drainage ditches serve as migration and dispersal corridors, and provide habitat for many plant and animal species. For example, amphibian and reptile species with southern derivations, such as green frog (Rana clamitans), may have originally moved into the Hardwood Range area through these routes (Vogt 1981).

# 2.5.1 Plant Communities

Plant communities within the Hardwood Range and the proposed expansion area were delineated from a combination of several sources including historic data and reports, the county soil surveys, and aerial photographs. The area was then ground-truthed during a two day field visit. This information was then combined to produce a cover type map (Figure 7). Associations were named using the nomenclature of Curtis (1959) and the Wisconsin Natural Community Working List, developed by the Wisconsin NHI. Dominant plant species listed for each plant community are primarily those reported by Curtis (1959), but also include field observations.







The composition of these plant communities may frequently be very different from the original reported by Curtis (1959) due to changes in land use, forestry management and the hydrology of the area.

Three general categories (based on growth form and life histories of the dominants) of vegetation cover exist within the Hardwood Range and the proposed expansion area - grassland communities, tall shrub communities, and forest communities. These general cover types are further divided into plant communities based on species composition and moisture regime within the community. Major plant communities of the Hardwood Range and the proposed expansion are discussed below.

- 2.5.1.1 Grasslands. In this report, the term 'grasslands' includes the prairies which are dominated by grasses (Graminae) and forbs and the sedge meadows. Although not a grassland, per se, sedge meadows are similarly treeless areas in which sedges (rather than grasses) are the dominants. However, grasses are often nearly as abundant as the sedges. Wisconsin lies on the northeast boundary of the American grasslands. These areas are generally very stable in the presence of fire, but may be succeeded by shrubs and/or forests in the absence of fire. Grasslands occupy the greatest area in the southwest corner of the state and gradually become smaller and more scattered as the tension zone is approached.
  - Low Prairie. According to Curtis (1959), low prairies are dominated by: big bluestem (Andropogon gerardi), bluejoint reed grass (Calamagrostis canadensis), prairie cordgrass (Spartina pectinata), Canada wildrye (Elymus canadensis), and panic-grass (Panicum leibergii). Field observations, made outside the growing season, generally confirm these dominants. These areas are found on Newson and Meehan soils primarily within the existing target area at the Hardwood Range. The low prairies are located on lowlands subject to ponding and/or flooding for a significant portion of the growing season. The soils of low prairies occupy the lowest positions on the catenas and have drainage impeded by a high water table or the presence of an impermeable soil layer. In an undrained condition, these areas meet the USACE jurisdictional wetland criteria.

- Sedge Meadow. According to Curtis (1959), sedge meadows are dominated by: hummock sedge (Carex stricta) and other sedges; bluejoint reed grass; fowl meadow grass (Poa palustris); rattlesnake and fowl manna grasses (Glyceria canadensis and G. striata); and prairie cordgrass. Field observations, made outside the growing season, generally confirm these dominants. Sedge meadows are open communities of wet soils where more than half the dominance is contributed by sedges rather than grasses. These areas are found on the Newson and Dawson soils within the Hardwood Range and proposed expansion area. The soils of sedge meadows typically occupy the bottom position on catenas and have drainage impeded by a high water table or the presence of an impermeable soil layer. In an undisturbed condition, these areas meet the USACE jurisdictional wetland criteria.
- 2.5.1.2 Tall Shrub Communities. These communities are fairly stable communities that are intermediate stages in succession from wet prairie, fen, and sedge meadow to lowland forest or conifer swamp. They are widely distributed throughout the state wherever the moist grasslands are present. Curtis (1959) identified two tall shrub communities in Wisconsin the alder thicket and southern shrub-carr. The two communities have different ranges; the alder type is primarily north of the tension zone and the non-alder type is south of it. Within the Hardwood Range and the proposed expansion area, the tall shrub communities are composed of both northern and southern species. However, tag alder (Alnus rugosa) was never observed as the dominant species, so these areas more closely resemble southern shrub-carr.
  - Southern Shrub-Carr. According to Curtis (1959), shrub-carr is dominated by: red osier dogwood (Cornus stolonifera), pussy willow (Salix discolor), Bebb's willow (Salix bebbiana), meadow willow (Salix petiolaris), and meadowsweet (Spirea alba). Field observations, made outside the growing season, generally confirm these dominants. These areas are found on the Newson and Dawson soils within the Hardwood Range and proposed expansion area. The soils of shrub-carr typically occupy the bottom position on catenas and have drainage impeded by a high water table or the presence of an

impermeable soil layer. In an undrained condition, these areas meet the USACE jurisdictional wetland criteria.

- 2.5.1.3 Forests. The forested areas within the Hardwood Range and the proposed expansion area appear to be composed of both northerly and southerly species. This is best explained by its location within the tension zone. The forested communities tend to be quite stable, although they may gradually move toward a more mesic condition in the absence of disturbance. Species composition and/or physiognomy of the forests within the Hardwood Range and the proposed expansion area are very different from the original reported by Curtis (1959). This is probably caused by several factors, including, but not limited to: the current absence of fire; current forestry management practices; and the historic attempts to drain and farm the area.
  - wet Forest. The wet forests within the Hardwood Range and the proposed expansion area are dissimilar in species composition from those identified by Curtis (1959). The wet forests within the Hardwood Range and the proposed expansion area are dominated by trembling aspen (Populus tremuloides), red maple, and jack pine. Based on the observed species composition in the herb and shrub strata, it appears that these communities developed from sedge meadow and southern shrub-carr in the absence of fire and with enhanced drainage. These communities were probably invaded by the mesic and somewhat invasive aspen and jack pine during drier years which would explain their current composition and physiognomy. These areas are found on the Newson, Meehan and Dawson soils within the Hardwood Range and proposed expansion area. The soils of wet forests typically occupy the bottom position on catenas and have drainage impeded by a high water table or the presence of an impermeable soil layer. In an undrained condition, these areas meet the USACE jurisdictional wetland criteria.
  - Mesic Forest. The mesic forests within the Hardwood Range and the proposed expansion area are dissimilar in species composition from those identified by Curtis (1959). The mesic forests within the Hardwood Range and the proposed expansion area may be dominated by one or more of the following species: paper birch (Betula

papyrifera), red maple, trembling aspen, white pine (*Pinus strobus*), and jack pine. These communities are found in narrow bands in a mid-catena position on the Meehan and Friendship soils adjacent to the lowland plant communities.

• Xeric Forest. The xeric forests within the Hardwood Range and the proposed expansion area may be dominated by one or more of the following species: jack pine, Hill's oak, black oak, white pine, red pine, or black cherry (Prunus serotina). Those areas dominated by white and red pine are usually pine plantations planted on the driest sites. Historically, some of these areas may have been jack pine barrens that were dominated by shrubs and herbaceous plants and were maintained by fire. In the absence of fire, tree density has increased significantly so that they are now the dominant growth form. These communities are found on the top of the catena on Friendship and Plainfield soils. If fire remains absent, these communities can be expected to continue to move toward a more closed canopy forest.

A list of plant species potentially occurring within the Hardwood Range and the proposed expansion area can be found in Table 2. The list was compiled from historic documents, publications, reports and field observations.

#### 2.5.2 Wildlife Communities

This section details the wildlife communities within the Hardwood range and the proposed expansion area.

2.5.2.1 Reptiles and Amphibians. A list of potential and documented amphibians and reptiles of the Hardwood Range and proposed expansion area is provided in Table 3. The source of the list is the ILUMP for Volk Field and the Hardwood Range (TN&Associates, Inc. 1994). The authors of the ILUMP consulted many sources in compiling this list, including: Vogt (1981); the range maps from the 1993 reporting package information from the Wisconsin Herpetological Atlas Project (Milwaukee Public Museum 1993); existing lists of amphibians and reptiles from

Table 2
Plant Species Potentially Occurring within the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin

|                         |                            | <del>!</del> | Pla      | nt Co | mmun     | unity <sup>a</sup> |    |  |
|-------------------------|----------------------------|--------------|----------|-------|----------|--------------------|----|--|
| Species                 | Common Name                | LP           | SM       | SC    | WF       | MF                 | XF |  |
|                         |                            | ····         |          |       |          |                    |    |  |
| Acer negundo            | box elder                  | Χ.           |          |       |          |                    |    |  |
| Acer rubrum             | red maple                  |              |          |       | X        | X                  | X  |  |
| Acer saccharum          | sugar maple                |              |          |       |          | X                  | X  |  |
| Achillea millefolium    | yarrow                     | X            |          |       |          |                    |    |  |
| Actaea alba             | white baneberry            |              |          |       |          | X                  |    |  |
| Adiantum pedatum        | maidenhair fern            |              |          |       |          | X                  |    |  |
| Agrostis stolonifera    | creeping bent-grass        |              | X        |       |          |                    |    |  |
| Alnus rugosa            | tag alder                  |              |          | X     | X        |                    |    |  |
| Ambrosia artemisiifolia | common ragweed             | X            |          |       |          |                    |    |  |
| Amorpha canescens       | lead-plant                 | X            |          |       |          |                    |    |  |
| Andromeda glaucophylla  | bog rosemary               |              |          |       |          |                    | X  |  |
| Andropogon gerardi      | big bluestem               | X            |          |       |          | X                  | Х  |  |
| Andropogon scoparius    | little bluestem            | X            |          |       |          |                    |    |  |
| Anemone canadensis      | Canada anemone             | X            | Х        |       | Î        |                    |    |  |
| Anemone quinquefolia    | wood anemone               |              |          |       |          | X                  | Х  |  |
| Angelica atropurpurea   | angelica                   |              | X        |       |          |                    |    |  |
| Apocynum                | spreading dogbane          |              |          |       |          |                    | X  |  |
| androsaemifolium        |                            |              |          |       | <u> </u> |                    | ]  |  |
| Aquilegia canadensis    | Canada columbine           |              |          |       |          |                    | X  |  |
| Aralia nudicaulis       | wild sarsaparilla          |              |          |       | X        | X                  | X  |  |
| Aralia racemosa         | spikenard                  |              |          |       |          | X                  |    |  |
| Asclepias incarnata     | marsh milkweed             | X            | X        | X     |          |                    |    |  |
| Asclepias syriaca       | common milkweed            | X            |          |       |          |                    |    |  |
| Aster oolentagiensis    | prairie heart-leaved aster | X            |          |       |          |                    |    |  |
| Aster ciliolatus        | northern heart-leaved      |              |          |       |          |                    | X  |  |
|                         | aster                      |              | <u> </u> |       |          |                    | ·  |  |
| Aster firmus            | shining aster              |              | X        | X     |          |                    |    |  |
| Aster lanceolatus       | eastern lined aster        |              | X        | X     |          |                    |    |  |
| Aster ericoides         | heath aster                | X            |          |       |          |                    |    |  |
| Aster laevis            | smooth aster               | X            |          |       |          |                    |    |  |
| Aster macrophyllus      | large-leaved aster         |              |          |       |          | X                  | X  |  |
| Aster novae-angliae     | New England aster          | X            |          |       |          |                    |    |  |
| Athyrium filix-femina   | lady fern                  |              |          |       |          | X                  |    |  |
| Betula alleghaniensis   | yellow birch               |              |          |       | X        |                    |    |  |
| Betula nigra            | river birch                |              |          | X     | X        |                    |    |  |

|                          |                       |                | Pla      | nt Co      | mmun   | ity <sup>a</sup> |  |
|--------------------------|-----------------------|----------------|----------|------------|--|------------------|--|
| Species                  | Common Name           | LP             | SM       | SC         |  | MF               | XF   |
|                          |                       |                |          |            |  |                  |  |
| Betula papyrifera        | white birch           |                |          |            | X  | X                | X  |
| Bidens frondosa          | devil's beggar-ticks  |                | X        |            |  |                  |  |
| Botrychium virginianum   | rattlesnake fern      |                |          |            |  | X                |  |
| Calamagrostis canadensis | bluejoint reed grass  | X              | X        | X          |  |                  |  |
| Carex aquatilis          | sedge                 |                | X        | X          |  |                  |  |
| Carex disperma           | sedge                 |                |          |            | X  |                  |  |
| Carex interior           | sedge                 |                | Х        |            |  |                  |  |
| Carex lasiocarpa         | sedge                 |                | X        |            |  |                  |  |
| Carex pensylvanica       | penn sedge            |                |          |            |  |                  | X  |
| Carex sartwellii         | sedge                 |                | Х        |            |  |                  |  |
| Carex stricta            | hummock sedge         |                | X        |            |  |                  |  |
| Carex trisperma          | sedge                 |                |          |            | X  |                  |  |
| Ceanothus herbaceous     | prairie redroot       |                |          |            |  | <u> </u>         | X  |
| Chamaedaphne calyculata  | leather leaf          |                |          |            | X  |                  |  |
| Chimaphila umbellata     | pipsissewa            |                | 1        |            |  |                  | X  |
| Cicuta maculata          | common water hemlock  | X              | X        | X          |  |                  |  |
| Cirsium discolor         | field thistle         | X              |          |            |  |                  |  |
| Cirsium muticum          | swamp thistle         |                |          | X          |  |                  |  |
| Clintonia borealis       | bead lily             |                |          |            |  | X                | X  |
| Comandra richardsiana    | bastard toad-flax     | X              |          |            |  | ļ                |  |
| Convolvulus arvensis     | field bindweed        |                |          |            |  |                  | Х  |
| Coptis trifolia          | goldthread            |                |          |            | X  |                  |  |
| Coreopsis palmata        | finger tickseed       |                |          |            |  | · ·              | Х  |
| Cornus canadensis        | bunchberry            |                | •        |            | X  |                  | X  |
| Cornus racemosa          | gray dogwood          |                |          | X          | X  | <u> </u>         |  |
| Cornus stolonifera       | red-osier dogwood     |                | 1        | X          |  |                  |  |
| Corylus americana        | American hazel        |                |          |            | -  | · · · · ·        | Х  |
| Corylus cornuta          | beaked hazel          |                |          |            |  | X                | X  |
| Cypripedium acaule       | moccasin flower       | i              |          |            | X  |                  |  |
| Danthonia spicata        | poverty oatgrass      |                |          |            | T  | 1                | X  |
| Desmodium canadense      | Canadian tick trefoil | X              |          |            | <del>                                     </del> |                  |  |
| Diervilla lonicera       | northern bush         | <u> </u>       | 1        | <b>†</b>   |  |                  | X  |
|                          | honeysuckle           |                |          |            | 1  |                  |  |
| Dirca palustris          | leatherwood           |                | <b>T</b> | 1          | 1  | X                |  |
| Dodecatheon meadia       | eastern shooting star | X              | 1        |            |  | † <u></u>        | <del>                                     </del> |
| Dryopteris spp.          | wood fern             | <del> </del> - | 1        | X          | X  | T                | <b>-</b>   |
| Eleocharis palustris     | spike rush            |                | X        | † <u> </u> | <del>                                     </del> | 1                | <del>                                     </del> |

Table 2 (continued)
Plant Species Potentially Occurring within the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin

|                           |                          | Plant Community <sup>a</sup> |  |  |  |  |  |  |
|---------------------------|--------------------------|------------------------------|--|--|--|--|--|--|
| Species                   | Common Name              | LP                           | SM   | SC   | WF   | MF   | XF   |  |
|                           | · .                      |                              |  |  |  |  |  |  |
| Elymus canadensis         | Canada wildrye           | X                            |  |  |  |  |  |  |
| Epigaea repens            | trailing arbutus         |                              |  |  |  |  | X  |  |
| Epilobium ciliatum        | American willow herb     |                              | X  |  |  |  |  |  |
| Equisetum arvense         | field horsetail          | X                            | X  | X  |  |  |  |  |
| Equisetum fluviatile      | water horsetail          |                              |  |  | X  |  |  |  |
| Equisetum laevigatum      | smooth scouring rush     | X                            |  |  |  |  |  |  |
| Equisetum sylvaticum      | woodland horsetail       |                              |  | X  |  |  |  |  |
| Eupatorium maculatum      | spotted joe-pye weed     |                              | X  | X  |  |  |  |  |
| Eupatorium perfoliatum    | boneset                  |                              | X  | X  |  |  |  |  |
| Euphorbia corollata       | flowering spurge         | X                            |  |  |  |  | X  |  |
| Fragaria virginiana       | wild strawberry          |                              |  |  |  |  | X  |  |
| Fraxinus nigra            | black ash                |                              |  | 1  | X  |  | <del></del>                                      |  |
| Galium boreale            | northern bedstraw        | X                            |  |  |  | <u> </u>   | <del>                                     </del> |  |
| Galium obtusum            | bluntleaf bedstraw       |                              | X  |  |  | 1  | <u> </u>   |  |
| Galium triflorum          | sweet-scented bedstraw   |                              |  | _  |  | X  | <b> </b>   |  |
| Gaultheria procumbens     | wintergreen              | <u> </u>                     |  |  | X  |  | x  |  |
| Gaultheria hispidula      | creeping snowberry       |                              |  | ١  | X  | 1  | <u> </u>   |  |
| Gaylussacia baccata       | black huckleberry        |                              | <u> </u>   | <b>†</b>   |  |  | X  |  |
| Gentiana andrewsii        | bottle gentian           | X                            |  |  | <b>†</b>   |  |  |  |
| Geranium maculatum        | wild geranium            | X                            |  |  |  |  |  |  |
| Glyceria striata          | fowl manna               |                              | X  | Х  |  |  | <b>†</b>   |  |
| Gymnocarpium dryopteris   | oak fern                 |                              |  |  |  |  |  |  |
| Helenium autumnale        | sneezeweed               |                              | X  |  | <del>                                     </del> |  | <b>†</b>   |  |
| Helianthemum canadense    | frostweed                |                              |  |  |  |  | X  |  |
| Helianthus grosseserratus | sawtooth sunflower       | X                            | X  | <u> </u>   |  | <del> </del>                                     |  |  |
| Heuchera richardsonii     | prairie alum root        | X                            | <del>                                     </del> | <del>                                     </del> |  | <del> </del>                                     |  |  |
| Ilex verticillata         | winterberry              |                              | <u> </u>   | X  | X  |  | 1  |  |
| Impatiens capensis        | jewelweed                |                              | X  | X  | X  | 1  | 1  |  |
| Iris shrevei              | blueflag iris            |                              | X  |  | <del>                                     </del> | 1  |  |  |
| Kalmia polifolia          | swamp laurel             |                              | <del> </del> -                                   | · · · · ·  | X  | <del>                                     </del> |  |  |
| Lactuca canadensis        | tall lettuce             | X                            | 1  | 1  | 1  | †  |  |  |
| Lathyrus venosus          | forest pea               | X                            | 1  |  | <del>                                     </del> | †—   | 1  |  |
| Lathyrus palustris        | meadow pea               | X                            | X  |  |  | <del>                                     </del> | 1  |  |
| Leptoloma cognatum        | fall witch grass         | <b>-</b>                     | 1  | +  | <del>                                     </del> | +  | $\frac{1}{x}$                                    |  |
| Liatris pycnostachya      | thick spike blazing star | X                            | +  | <del>                                     </del> | +  | +  | A  |  |
| Lilium superbum           | Turk's-cap lily          | $\frac{\lambda}{X}$          | +  |  |  | +  | +  |  |
| Linnaea borealis          | twinflower               | +^                           | +  | <del></del>                                      | $+$ $\overline{x}$                               | X  | X  |  |

|                         |                          |  | Pla  | nt Co  | nmun   | ity <sup>a</sup>                                 |  |  |
|-------------------------|--------------------------|--|--|--|--|--|--|--|
| Species                 | Common Name              | LP   | SM   | SC   | WF   | MF   | XF   |  |
|                         |                          |  |  |  |  |  |  |  |
| Lithospermum canescens  | hoary puccoon            | X  |  |  |  |  |  |  |
| Lonicera oblongifolia   | swamp fly-honeysuckle    |  |  |  |  | X  | 1  |  |
| Lupinus perennis        | wild lupine              |  |  |  |  |  | X  |  |
| Lycopodium annotinum    | stiff clubmoss           |  |  |  |  | X  |  |  |
| Lycopodium lucidulum    | shining clubmoss         |  |  |  |  | X  |  |  |
| Lycopodium obscurum     | ground pine              |  |  |  |  | Х  | Х  |  |
| Lycopus americanus      | American water-          |  | X  | X  |  |  |  |  |
|                         | horehound                |  |  |  |  |  |  |  |
| Lycopus uniflorus       | northern water-horehound | ,  | X  | X  |  |  |  |  |
| Lysimachia quadrifolia  | whorled loosestrife      |  |  |  |  |  | X  |  |
| Maianthemum canadense   | Canada mayflower         |  |  |  | X  | X  | Х  |  |
| Melampyrum lineare      | cow wheat                |  |  |  | <b>†</b>   |  | X  |  |
| Mentha arvensis         | field mint               |  | X  |  | <u> </u>   | -  |  |  |
| Mitchella repens        | partridgeberry           |  |  |  |  | X  | X  |  |
| Mitella nuda            | naked mitrewort          |  |  | -  |  | X  |  |  |
| Monarda fistulosa       | wild bergamot            | X  |  |  | 1  |  | <u> </u>   |  |
| Nemopanthus mucronatus  | common mountain holly    |  | <u> </u>   |  | X  | <u> </u>   |  |  |
| Onoclea sensibilis      | sensitive fern           | <del>                                     </del> | <u> </u>   | X  | X  |  |  |  |
| Oryzopsis asperifolia   | rough-leaved ricegrass   | <b> </b>   | <del>                                     </del> |  | <del> </del>                                     |  | X  |  |
| Osmorhiza claytonii     | sweet cicely             | 1  | <b>†</b>   |  |  | X  |  |  |
| Osmunda cinnamomea      | cinnamon fern            |  | 1  | 1  | X  | <u> </u>   | $\vdash$   |  |
| Oxypolis rigidior       | common water dropwort    | X  | <u> </u>   |  |  |  | <u> </u>   |  |
| Panicum leibergii       | switchgrass              | X  | <b>†</b>   | <del> </del>                                     |  |  |  |  |
| Parthenocissus vitacea  | grape woodbine           | 1  | †  |  | X  |  |  |  |
| Phalaris arundinacea    | reed canary grass        | X  | X  | X  | $\frac{1}{X}$                                    | <b>-</b>   | <del>                                     </del> |  |
| Phlox pilosa            | prairie phlox            | X  | <del>                                     </del> |  | <del> </del>                                     |  |  |  |
| Pinus banksiana         | jack pine                |  | <b> </b>   | 1  | X  | X  | X  |  |
| Pinus resinosa          | red pine                 |  | <del> </del> -                                   |  | <del> </del> -                                   | X  | X  |  |
| Pinus strobus           | white pine               | <u> </u>   | 1  | <del>                                     </del> | +  | $\frac{X}{X}$                                    | X  |  |
| Poa palustris           | fowl meadow grass        |  | X  | X  | +  | <del>  ^</del>                                   | <del>  ^</del>                                   |  |
| Polygonum cilinode      | climbing false buckwheat | <del> </del>                                     | 1  | X  | $\frac{1}{X}$                                    | <del> </del>                                     | <del>                                     </del> |  |
| Polygonum pensylvanicum | smartweed                | X  |  | X  | <u>^</u>   | -  | -  |  |
| Polygala paucifolia     | flowering wintergreen    | T ^  | +  | $+\Delta$  | <del>                                     </del> | <del>                                     </del> | X  |  |
| Polygonatum pubescens   | solomon's seal           | +  | +-   | -  | -  | $\frac{1}{x}$                                    | <del>  ^</del>                                   |  |
|                         |                          | +  | -  | +  | V  | <del>  ^</del>                                   | -  |  |
| Populus balsamifera     | balsam poplar            | +  | <del> </del>                                     |  | X  | 177  | 177  |  |
| Populus grandidentata   | large-toothed aspen      | 1  | <del>                                     </del> |  | 77   | X  | X  |  |
| Populus tremuloides     | trembling aspen          | 1  |  | 1  | X  | <u> </u>   | X  |  |

Table 2 (continued)
Plant Species Potentially Occurring within the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin

|                           | ****                    | Plant Community <sup>a</sup> |              |                     |                    |  |  |  |
|---------------------------|-------------------------|------------------------------|--------------|---------------------|--------------------|--|--|--|
| Species                   | Common Name             | LP                           | SM           | SC                  | WF                 | MF   | XF   |  |
|                           |                         |                              |              |                     |                    |  |  |  |
| Prenanthes racemosa       | glaucous white lettuce  | X                            |              |                     |                    |  |  |  |
| Prunus pensylvanica       | pin cherry              |                              |              |                     |                    |  | X  |  |
| Prunus serotina           | black cherry            |                              |              |                     |                    | X  | X  |  |
| Prunus virginiana         | chokecherry             |                              |              |                     |                    | X  | X  |  |
| Pteridium aquilinum       | bracken fern            |                              |              |                     |                    |  | X  |  |
| Pycnanthemum virginianum  | mountain mint           | X                            |              |                     |                    |  |  |  |
| Pyrola elliptica          | elliptic shinleaf       |                              |              |                     |                    |  | X  |  |
| Pyrola rotundifolia       | rounded shinleaf        | Ī                            |              |                     |                    |  | X  |  |
| Pyrola secunda            | one-sided shinleaf      |                              |              |                     |                    |  | X  |  |
| Quercus alba              | white oak               |                              |              |                     |                    | X  | X  |  |
| Quercus rubra             | red oak                 |                              |              |                     |                    | X  |  |  |
| Quercus ellipsoidalis     | Hill's oak              |                              |              |                     |                    | X  | X  |  |
| Quercus macrocarpa        | bur oak                 |                              |              |                     |                    |  | X  |  |
| Quercus velutina          | black oak               |                              |              |                     |                    | 1  | Х  |  |
| Rhus glabra               | smooth sumac            | X                            |              |                     |                    |  |  |  |
| Rosa spp.                 | rose                    | X                            |              |                     |                    |  | X  |  |
| Rubus allegheniensis      | common blackberry       |                              |              |                     |                    |  | Х  |  |
| Rubus idaeus              | red raspberry           |                              |              |                     |                    |  | X  |  |
| R. pubescens              | dwarf raspberry         |                              |              |                     |                    |  | X  |  |
| Rudbeckia hirta           | black-eyed Susan        | X                            | 1            |                     | 1                  |  |  |  |
| Rumex orbiculatus         | great water dock        |                              | X            | X                   |                    |  | † ·  |  |
| Rumex verticillatus       | water dock              |                              | X            |                     |                    |  |  |  |
| Salix bebbiana            | Bebb's willow           |                              |              | X                   |                    |  |  |  |
| Salix discolor            | pussy willow            |                              |              | X                   |                    |  | X  |  |
| Salix humilis             | upland willow           | X                            |              | X                   |                    |  | 1  |  |
| Salix petiolaris          | meadow willow           |                              |              | X                   |                    |  |  |  |
| Sambucus pubens           | elderberry              |                              |              |                     | 1                  | X  | <del>                                     </del> |  |
| Sarracenia purpurea       | pitcher plant           |                              | 1            | 1                   | X                  |  | <b>†</b>   |  |
| Scirpus cyperinus         | woolgrass               | X                            | X            | X                   | 1                  | <del>                                     </del> | +  |  |
| Scutellaria galericulata  | marsh skullcap          | T                            | X            | <del> </del>        | +                  | <del>                                     </del> | †  |  |
| Silphium terebinthinaceum | basal-leaved rosin weed | +x                           | <del> </del> |                     |                    | 1  |  |  |
| Silphium integrifolium    | prairie rosin weed      | $\frac{1}{X}$                | 1            | 1                   | 1                  | <del> </del>                                     | <del> </del>                                     |  |
| Smilacina racemosa        | false Solomon's seal    |                              | 1            | †                   | +                  | X  | X  |  |
| Smilacina stellata        | false Solomon's seal    | +                            | +            | 1 -                 | +                  | + **   | +  |  |
| Smilacina trifolia        | false Solomon's seal    | +-*                          |              |                     | $+$ $\overline{x}$ | +  | +  |  |
| Solidago canadensis       | Canada goldenrod        | +                            | X            | X                   | +^                 | +  | +  |  |
| Solidago gigantea         | giant goldenrod         | X                            | X            | $\frac{\Lambda}{X}$ |                    | +  | +  |  |

Table 2 (continued) Plant Species Potentially Occurring within the Hardwood Range and Proposed Expansion Area Juneau and Wood Counties, Wisconsin

|                          |                         |    | Plant Community <sup>a</sup> |    |    |    |    |  |
|--------------------------|-------------------------|----|------------------------------|----|----|----|----|--|
| Species                  | Common Name             | LP | SM                           | SC | WF | MF | XF |  |
|                          |                         |    |                              |    |    |    |    |  |
| Solidago graminifolia    | grass-leaved goldenrod  | X  |                              |    |    |    |    |  |
| Solidago rigida          | stiff goldenrod         | X  |                              |    |    |    |    |  |
| Sorghastrum nutans       | Indian grass            | X  |                              |    |    |    |    |  |
| Spartina pectinata       | prairie cordgrass       | X  | X                            | X  |    |    |    |  |
| Spiraea alba             | meadowsweet             | X  |                              | X  |    |    |    |  |
| Spiraea tomemtosa        | hardhack                | X  |                              | X  |    |    |    |  |
| Sporobolus heterolepis   | prairie dropseed        | X  |                              |    |    |    |    |  |
| Stachys palustris        | hedge nettle            |    | X                            | X  |    |    |    |  |
| Streptopus roseus        | twisted stalk           |    |                              |    |    | X  | X  |  |
| Thalictrum dasycarpum    | meadow rue              | X  | X                            | X  |    | _  |    |  |
| Thelypteris palustris    | marsh fern              |    | X                            |    |    |    |    |  |
| Tradescantia ohiensis    | smooth spiderwort       | X  |                              |    |    |    |    |  |
| Trientalis borealis      | starflower              |    |                              |    |    | X  | X  |  |
| Trillium grandiflorum    | large-flowered trillium |    |                              |    |    | Х  |    |  |
| Typha latifolia          | cattail                 | X  | X                            | X  |    |    |    |  |
| Ulmus americana          | American elm            |    |                              |    | X  |    | 1  |  |
| Uvularia sessilifolia    | sessile bellwort        |    |                              |    |    |    | X  |  |
| Uvularia grandiflora     | large-flowered bellwort |    |                              |    |    | X  | X  |  |
| Vaccinium angustifolium  | lowbush blueberry       |    |                              |    | X  |    | X  |  |
| Vaccinium macrocarpon    | cranberry               |    | X                            |    | X  |    |    |  |
| Vaccinium myrtilloides   | velvetleaf blueberry    |    |                              |    | X  |    |    |  |
| Vaccinium oxycoccus      | small cranberry         |    |                              |    | X  |    |    |  |
| Verbena hastata          | blue vervain            | X  | X                            | X  |    |    | 1  |  |
| Veronicastrum virginicum | Culver's root           | X  |                              |    |    |    |    |  |
| Viola cucullata          | marsh blue violet       |    |                              | X  |    | X  |    |  |
| Viola macloskeyi         | wild white violet       |    |                              |    | X  |    | Τ  |  |
| Viola pubescens          | yellow forest violet    |    |                              |    |    | X  |    |  |
| Waldsteinia fragarioides | barren strawberry       |    |                              |    |    |    | X  |  |
| Zizia aurea              | golden Alexanders       | X  |                              | 1  |    | 1  | 1  |  |

<sup>a</sup> Plant communities are abbreviated as follows

LP = low prairie SM = sedge meadow SC = shrub-carr WF = wet forest

MF = mesic forest

XF = xeric forest

Table 3
Amphibians And Reptiles Potentially Occurring within the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin.

| Species                                 | Common Name (Status <sup>a, b</sup> ) | Occurrence<br>Likelihood <sup>c</sup> |
|---|---------------------------------------|---------------------------------------|
| Ambystoma laterale                      | blue-spotted salamander               | L                                     |
| Ambystoma tigrinum                      | eastern tiger salamander              | U                                     |
| Notophthalmus viridescens louisianensis | central newt                          | L                                     |
| Bufo americanus americanus              | eastern american toad                 | L                                     |
| Acris crepitans                         | Blanchard's cricket frog (we)         | U                                     |
| Pseudacris triseriata triseriata        | western chorus frog                   | L                                     |
| Pseudacris [= Hyla] crucifer crucifer   | northern spring peeper                | L                                     |
| Hyla versicolor                         | eastern gray treefrog                 | L                                     |
| Hyla chrysoscelis                       | cope's gray treefrog                  | L                                     |
| Rana clamitans melanota                 | green frog                            | L                                     |
| Rana pipiens                            | northern leopard frog                 | L                                     |
| Rana sylvatica                          | wood frog                             | L                                     |
| Chelydra serpentina                     | snapping turtle                       | L                                     |
| Emydoidea blandingii                    | blanding's turtle (wt, fc2)           | L                                     |
| Chrysemys picta                         | painted turtle                        | L                                     |
| Ophisaurus attenuattus                  | western slender glass lizard (we)     | L                                     |
| Eumeces fasciatus                       | five-lined skink                      | L                                     |
| Heterodon platyrhinos                   | eastern hognose snake                 | L                                     |
| Opheodrys vernalis vernalis             | eastern smooth green snake            | L                                     |
| Coluber constrictor foxi                | blue racer                            | L                                     |
| Elaphe vulpina vulpina                  | western fox snake                     | L                                     |
| Pituophis melanoleucus                  | bull snake (wsc)                      | U                                     |
| Lampropeltis triangulum triangulum      | eastern milk snake                    | U                                     |
| Thamnophis sirtalis sirtalis            | eastern garter snake                  | L                                     |
| Thamnophis radix                        | eastern plains garter snake           | U                                     |
| Storeria dekayi                         | brown snake                           | L                                     |
| Storeria occipitomaculata               | northern red-bellied snake            | L                                     |
| Nerodia sipedon                         | northern water snake                  | L                                     |
| Sistrurus catenatus catenatus           | eastern massasauga (we, fc2)          | L                                     |

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#### Table 3 (continued)

### Amphibians And Reptiles Potentially Occurring within the Hardwood Range and Proposed Expansion Area Juneau and Wood Counties, Wisconsin.

Notes: a Protection category designated by Wisconsin Department of Natural Resources indicating the status of a species in Wisconsin.

WE = endangered WT = threatenedWSC = special concern

<sup>b</sup> Federal protection category designated by the Office of Endangered Species, U.S. Fish and Wildlife Service indicating the biological status of a species in the United States.

FC2 = candidate, under review for listing

<sup>c</sup> Occurrence likelihood L = likely to be present U = unlikely to be present Fort McCoy, Necedah Wildlife Refuge, and the original ILUMP for Volk Field; and conversations with authorities in the discipline.

Due to the limited nature of data occurrences and abundance, the authors of the ILUMP reported occurrence likelihood only in terms of two categories — likely (L) and unlikely (U). A likelihood of "L" is assigned to a species for which appropriate habitat is present and that is either documented for Hardwood Range or nearby areas or is relatively abundant in the larger region. Species that are rare in the immediate area or throughout their entire range, or for which appropriate habitat appears to be limited, are given a likelihood of "U." Species for which appropriate habitat appeared to be completely lacking on Hardwood Range were excluded from this list even though they may be documented for nearby areas. This is particularly true of species that prefer rivers or large bodies of water such as spiny softshell turtle (Apalone [=Trionyx] spinifera) (recorded from Necedah National Wildlife Refuge), and wood turtle (Clemmys insculpta) (recorded from Fort McCoy). The only rare amphibian and reptile species (species that are either state- or federally-listed threatened or endangered) that are potentially or actually present within the Hardwood Range and the proposed expansion area are two reptiles: (1) the eastern massasauga rattlesnake (Sistrurus catenatus catenatus, Wisconsin Endangered); and (2) the Blanding's turtle (Emydoidea blandingii, Wisconsin Threatened). Both of these species are found in lowland habitats, particularly along rivers. The eastern massasauga rattlesnake is a shy, generally non-aggressive rattlesnake which has been found in wetlands along the Yellow River and is therefore very likely to occur within or near the Hardwood Range and proposed expansion area.

2.5.2.2 Fish. A list of fishes found in the drainages that include the Hardwoods Range is included as Table 4. The list was compiled from Wisconsin Department of Natural Resources (WDNR) (1992) records. The ranges of fish species described from these investigations are summarized graphically in WDNR (1992) and Becker (1983).

The Hardwood Range and proposed expansion area is drained by Cranberry Creek and its tributaries. Of the 36 species of fishes (representing eight families) recorded from area

Table 4
Fish Species Reported From Water Bodies on or near the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin

| Species                 | Common Name               | Sub-basin <sup>a, b</sup> | Statewide Occurrence<br>(% lakes/% streams) |
|-------------------------|---------------------------|---------------------------|---|
| Umbra limi              | central mudminnow         | Y,C                       | 6/94  |
| Esox lucius             | northern pike             | Y                         | 32/68                                       |
| Campostoma oligolepis   | largescale<br>stoneroller | Y                         | 3/97  |
| Hybognathus hankinsoni  | brassy minnow             | Y,C                       | 4/96  |
| Nocomis biguttatus      | hornyhead chub            | Y,C                       | 3/97  |
| Notemigonus crysoleucas | golden shiner             | Y,C                       | 45/55                                       |
| Notropis cornutus       | common shiner             | Y,C                       | 9/91  |
| Notropis dorsalis       | bigmouth shiner           | Y,C                       | 1/99  |
| Notropis heterodon      | blacknose shiner          | Y,C                       | 43/55                                       |
| Notropis rubellus       | rosyface shiner           | Y                         | 4/96  |
| Notropis umbratilis     | redfin shiner             | Y,C,H                     | 24,76                                       |
| Notropis volucellus     | mimic shiner              | Y                         | 48/52                                       |
| Phoxinus eos            | northern redbelly dace    | Y,C                       | 6/94  |
| Phoxinus neogaeus       | finescale dace            | Y,C,L                     | 9/91  |
| Pimephales notatus      | bluntnose minnow          | Y,C                       | 29/71                                       |
| Pimephales promelas     | fathead minnow            | Y,C,L                     | 11/89                                       |
| Rhinichthys atratulus   | blacknose dace            | Y,C                       | 1/99  |
| Semotilus atromaculatus | creek chub                | Y,C,L                     | 2/98  |
| Semotilus margarita     | pearl dace                | C                         | 3/97  |
| Catostomus commersoni   | white sucker              | Y,C,L                     | 11/89                                       |
| Hypentelium nigricans   | northern hog sucker       | Y                         | 1/99  |
| Moxostoma erythrurum    | golden redhorse           | Y                         | 6/94  |
| Ictalurus melas         | black bullhead            | Y,C,L                     | 24/76                                       |
| Noturus flavus          | stonecat                  | Y                         | 0/100                                       |
| Culaea inconstans       | brook stickleback         | Y,C,L                     | 2/998                                       |
| Ambloplites rupestris   | rock bass                 | Y                         | 34/66                                       |
| Lepomis gibbosus        | pumpkinseed               | Y,C                       | 54/46                                       |

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### Table 4 (continued) Fish Species Reported From Water Bodies on or near the Hardwood Range and Proposed Expansion Area Juneau and Wood Counties, Wisconsin

| Species                         | Common Name      | Sub-basin <sup>a, b</sup> | Statewide Occurrence (% lakes/% streams) |
|---------------------------------|------------------|---------------------------|--|
| Micropterus dolmieui            | smallmouth bass  | Y                         | 29/71                                    |
| Micropterus salmoides           | largemouth bass  | Y                         | 58/42                                    |
| Etheostoma caeruleum            | rainbow darter   | Y                         | 9/91                                     |
| Etheostoma exile                | Iowa darter      | Y                         | 57/43                                    |
| Etheostoma flabellare           | fantail darter   | Y,C                       | 1/99                                     |
| Etheostoma nigrum               | Johnny darter    | Y,C                       | 15/85                                    |
| Percina caprodes                | logperch         | Y                         | 28/72                                    |
| Percina maculata                | blackside darter | Y,C                       | 1/99                                     |
| Stizostedion vitreum<br>vitreum | walleye          | Y                         | 42/58                                    |

Notes: Area sub-basins:

Y = Yellow River

C = Cranberry Creek

L = Little Yellow River, including Sprague-Mather Flowage

H = Hemlock Creek

<sup>&</sup>lt;sup>b</sup> Fago (1992)

drainages, all except one species (pearl dace [Semotilus margarita]) occur in the Yellow River. Of the 36 species, 22 were reported from Cranberry Creek and its tributaries.

As shown in Table 4, most of the fish species reported from the site area drainages are primarily stream inhabitants. Only the pumpkinseed sunfish (*Lepomis gibbosus*), the Iowa darter (*Etheostoma exile*), and the largemouth bass (*Micropterus salmoides*) are more frequently found in lakes than in streams.

One species reported to occur in the Yellow River, Cranberry Creek, and Hemlock Creek, the redfin shiner (*Notropis umbratilis*), is a state-listed threatened species in Wisconsin. This species usually occurs in slow moving, turbid waters, and in pools in low gradient streams. It is a southern species, with central Wisconsin at the northern extent of its range. None of the remaining reported species are state- or federally-listed threatened or endangered species.

2.5.2.3 Birds. A list of potential and documented bird species for Hardwood Range and the proposed expansion area is provided in Table 5. The source of the list is the ILUMP for Volk Field and the Hardwood Range (TN&Associates, Inc. 1994). The authors of the ILUMP consulted many sources in compiling this list, including: Robbins (1991); a bird list from Necedah Wildlife Refuge; a bird survey conducted at Mill Bluff State Park (unpublished data from E. Epstein, Bureau of Endangered Resources, Wisconsin Department of Natural Resources); and interviews with recognized birdwatchers in the state and region. The original ILUMP (Chryst 1987) was also used, which in turn relied heavily on long-term personal observations by Mike Ebersold, an ardent bird watcher who is a security guard at Volk Field.

The residential status of each species was assigned, designating them as being residents year-round (R), seasonal breeders (S) present only in the breeding season (roughly May through August), or transients (T) passing through only in the non-breeding seasons, (usually spring or fall). A likelihood of occurrence was assigned ranging from 1 for most likely, to 3 for least likely. Other species whose ranges are primarily to the south or west may also be sighted at Hardwood Range or the proposed expansion area as transients, or, less likely, as seasonal

Table 5
Birds Potentially Occurring within or near the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin

| Scientific Name       | Common Name (Status <sup>a, b</sup> ) | Resident<br>Status <sup>c</sup> | Occurrence<br>Likelihood <sup>d</sup> |
|-----------------------|---------------------------------------|---------------------------------|---------------------------------------|
| Gavia immer           | common loon                           | T                               | 3                                     |
| Podilymbus podiceps   | pied-billed grebe                     | S                               | 1                                     |
| Podiceps auritus      | horned grebe                          | S                               | 3                                     |
| Phalacrocorax auritus | double-crested cormorant              | T                               | 3                                     |
| Botaurus lentiginosus | american bittern                      | S                               | 2                                     |
| Ixobrychus exilis     | least bittern                         | S                               | 3                                     |
| Ardea herodias        | great blue heron                      | S                               | 2                                     |
| Casmerodius albus     | great egret (wt)                      | Т                               | 3                                     |
| Egretta thula         | snowy egret                           | T                               | 3                                     |
| Bubulcus ibis         | cattle egret                          | T                               | 3                                     |
| Butorides striatus    | green-backed heron                    | S                               | 1                                     |
| Nycticorax nycticorax | black-crowned night heron             | Т                               | 3                                     |
| Cygnus columbianus    | tundra swan                           | T                               | 2                                     |
| Cygnus buccinator     | trumpeter swan (we, fc2)              | S                               | 3                                     |
| Chen caerulescens     | snow goose                            | T                               | 2                                     |
| Branta canadensis     | Canada goose                          | S                               | 1                                     |
| Aix sponsa            | wood duck                             | S                               | 1                                     |
| Anas crecca           | green-winged teal                     | S                               | 1                                     |
| Anas rubripes         | american black duck                   | S                               | 1                                     |
| Anas platyrhynchos    | mallard                               | S                               | 1                                     |
| Anas acuta            | northern pintail                      | S                               | 3                                     |
| Anas discors          | blue-winged teal                      | S                               | 1                                     |
| Anas clypeata         | northern shoveler                     | T                               | 2                                     |
| Anas strepera         | gadwall                               | T                               | 2                                     |
| Anas americana        | American wigeon                       | S                               | 2                                     |
| Aythya valisineria    | canvasback                            | T                               | 2                                     |
| Aythya americana      | redhead                               | T                               | 2                                     |
| Aythya collaris       | ring-necked duck                      | T                               | 2                                     |
| Aythya marila         | greater scaup                         | Т                               | 3                                     |
| Aythya affinis        | lesser scaup                          | Т                               | 1                                     |
| Clangula hyemalis     | oldsquaw                              | T                               | 3                                     |
| Bucephala clangula    | common goldeneye                      | Т                               | 2                                     |
| Bucephala albeola     | bufflehead                            | T                               | 2                                     |
| Lophodytes cucullatus | hooded merganser                      | S                               | 2                                     |

| Scientific Name            | Common Name (Status <sup>a, b</sup> ) | Resident<br>Status <sup>c</sup> | Occurrence<br>Likelihood <sup>c</sup> |
|----------------------------|---------------------------------------|---------------------------------|---------------------------------------|
| Mergus merganser           | common merganser                      | Т                               | 3                                     |
| Mergus serrator            | red-breasted merganser                | T                               | 3                                     |
| Oxyura jamaicensis         | ruddy duck                            | T                               | 3                                     |
| Cathartes aura             | turkey vulture                        | S                               | 2                                     |
| Pandion haliaetus          | osprey (wt)                           | Т                               | 2                                     |
| Haliaeetus leucocephalus   | bald eagle (wt, ft)                   | Т                               | 3                                     |
| Circus cyaneus             | northern harrier                      | S                               | 3                                     |
| Accipiter striatus         | sharp-shinned hawk                    | T                               | 2                                     |
| Accipiter cooperii         | Cooper's hawk                         | R                               | 2                                     |
| Accipiter gentilis         | northern goshawk (fc2)                | Т                               | 3                                     |
| Buteo lineatus             | red-shouldered hawk (wt)              | S                               | 3                                     |
| Buteo platypterus          | broad-winged hawk                     | S                               | 1                                     |
| Buteo jamaicensis          | red-tailed hawk                       | R                               | <u> </u>                              |
| Buteo lagopus              | rough-legged hawk                     | T                               | 2                                     |
| Aquila chrysaetos          | golden eagle                          | T                               | 3                                     |
| Falco sparverius           | american kestrel                      | R                               | 1                                     |
| Falco columbarius          | merlin                                | T                               | 3                                     |
| Falco peregrinus           | peregrine falcon (we, fe)             | T                               | 3                                     |
| Phasianus colchicus        | ring-necked pheasant                  | R                               | 2                                     |
| Bonasa umbellus            | ruffed grouse                         | R                               | 1                                     |
| Tympanuchus phasianellus   | sharp-tailed grouse                   | T                               | 3                                     |
| Meleagris gallopavo        | wild turkey                           | R                               | 1                                     |
| Colinus virginianus        | northern bobwhite                     | R                               | 3                                     |
| Coturnicops noveboracensis | yellow rail                           | T                               | 3                                     |
| Rallus limicola            | virginia rail                         | S                               | 2                                     |
| Porzana carolina           | sora                                  | S                               | 1                                     |
| Gallinula chloropus        | common moorhen                        | T                               | 3                                     |
| Fulica americana           | american coot                         | S                               | 1                                     |
| Grus canadensis            | sandhill crane                        | S                               | 1                                     |
| Pluvialis squatarola       | black-bellied plover                  |                                 | 3                                     |
| Pluvialis dominica         | lesser golden plover                  | <u>T</u>                        | 3                                     |
| Charadrius semipalmatus    | semi-palmated plover                  | T                               | 3                                     |
| Charadrius vociferus       | killdeer                              | S                               | 1                                     |
| Recurvirostra americana    | american avocet                       |                                 | 3                                     |
| Tringa melanoleuca         | greater yellowlegs                    | T                               | 3                                     |
| Tringa flavipes            | lesser yellowlegs                     | <u>T</u>                        | 1                                     |
| Tringa solitaria           | solitary sandpiper                    | T T                             | 2                                     |

| Actitis macularia          | spotted sandpiper         | S        | 1        |
|----------------------------|---------------------------|----------|----------|
| Bartramia longicauda       | upland sandpiper          | S        | 3        |
| Limosa haemastica          | hudsonian godwit          | T        | 3        |
| Limosa fedoa               | marbled godwit            | T        | 3        |
| Calidris pusilla           | semipalmated sandpiper    | T        | 3        |
| Calidris mauri             | western sandpiper         | T T      | 3        |
| Calidris fuscicollis       | white-rumped sandpiper    | T        | 3        |
| Calidris melanotos         | pectoral sandpiper        | T        | 1        |
| Calidris alpina            | dunlin                    | T        | 3        |
| Calidris himantopus        | stilt sandpiper           | T        | 3        |
| Tryngites subruficollis    | buff-breasted sandpiper   | T        | 3        |
| Limnodromus griseus        | short-billed dowitcher    | T        | 3        |
| Limnodromas scolopaceus    | long-billed dowitcher     | T        | 3        |
| Gallinago gallinago        | common snipe              | S        | 1        |
| Scolopax minor             | American woodcock         | S        | 1        |
| Phalaropus tricolor        | wilson's phalarope        | T        | 3        |
| Phalaropus lobatus         | red-necked phalarope      |          | 3        |
| Larus philadelphia         | bonaparte's gull          | T        | 3        |
| Larus delawaresis          | ring-billed gull          |          | 2        |
| Larus argentatus           | herring gull              | T        | 3        |
| Sterna hirundo             | common tern (we, fc2)     | T        | 3        |
| Sterna forsteri            | Forster's tern (we)       | T        | 3        |
| Chlidonias niger           | black tern (fc2)          | S        | 2        |
| Columba livia              | rock dove                 | R        | 1        |
| Zenaida macroura           | mourning dove             | R        | 1        |
| Coccyzus erythropthalmus   | black-billed cuckoo       | S        | 1        |
| Coccyzus americanus        | yellow-billed cuckoo      | S        | 2 ·      |
| Otus asio                  | eastern screech owl       | R        | 3        |
| Bubo virginianus           | great horned owl          | R        | 1        |
| Nyctea scandiaca           | snowy owl                 | T        | 3        |
| Strix varia                | barred owl                | R        | · 1      |
| Asio otus                  | long-eared owl            | R        | 2        |
| Asio flammeus              | short-eared owl           | T        | 3        |
| Aegolius acadicus          | northern saw-whet owl     | R        | 3        |
| Chordeiles minor           | common nighthawk          | S        | 1        |
| Caprimulgus vociferus      | whip-poor-will            | S        | 1        |
| Chaetura pelagica          | chimney swift             | S        | 2        |
| Archilochus colubris       | ruby-throated hummingbird | S        | 2        |
| Ceryle alcyon              | belted kingfisher         | S        | 1        |
| Melanerpes erythrocephalus | red-headed woodpecker     | R        | 1        |
| Melanerpes carolinus       | red-bellied woodpecker    | R        | 2        |
| Sphyrapicus varius         | yellow-bellied sapsucker  | S        | 2        |
| приугирново кинив          | yonow-bonnou sapsucker    | <u> </u> | <u> </u> |

| Picoides pubescens         | downy woodpecker                 | R        | 1        |
|----------------------------|----------------------------------|----------|----------|
| Picoides villosus          | hairy woodpecker                 | R        | 1        |
| Colaptes auratus           | northern flicker                 | S        | 11       |
| Dryocopus pileatus         | pileated woodpecker              | R        | 2        |
| Contopus borealis          | olive-sided flycatcher           | T        | 3        |
| Contopus virens            | eastern wood-pewee               | S        | 1        |
| Empidonax flaviventris     | yellow-bellied flycatcher        | T        | 3        |
| Empidonax alnorum          | alder flycatcher                 | S        | 2        |
| Empidonax traillii         | willow flycatcher                | S        | 3        |
| Empidonax minimus          | least flycatcher                 | S        | 1        |
| Sayornis phoebe            | eastern phoebe                   | S        | 1        |
| Myiarchus crinitus         | great crested flycatcher         | S        | 1        |
| Tyrannus tyrannus          | eastern kingbird                 | S        | 1        |
| Eremophila alpestris       | horned lark                      | S        | 1        |
| Progne subis               | purple martin                    | S        | 3        |
| Tachycineta bicolor        | tree swallow                     | S        | 1        |
| Stelgidopteryx serripennis | northern rough-winged<br>swallow | S        | 2        |
| Riparia riparia            | bank swallow                     | S        | 2        |
| Hirundo pyrrhonota         | cliff swallow                    | S        | 2        |
| Hirundo rustica            | barn swallow                     | S        | 1        |
| Cyanocitta cristata        | blue jay                         | R        | 1        |
| Corvus brachyrhynchos      | american crow                    | R        | 1        |
| Corvus corax               | common raven                     | R        | 3        |
| Parus atricapillus         | black-capped chickadee           | R        | 1        |
| Parus bicolor              | tufted titmouse                  | R        | 3        |
| Sitta canadensis           | red-breasted nuthatch            | T        | 2        |
| Sitta carolinensis         | white-breasted nuthatch          | R        | <u>=</u> |
| Certhia americana          | brown creeper                    | T        | 2        |
| Troglodytes aedon          | house wren                       | S        | 1        |
| Troglodytes troglodytes    | winter wren                      | T        | 2        |
| Cistothorus platensis      | sedge wren                       | S        | 3        |
| Cistothorus palustris      | marsh wren                       | S        | 2        |
| Regulus satrapa            | golden-crowned kinglet           | T        | 2        |
| Regulus calendula          | ruby-crowned kinglet             | T        | 1        |
| Pilioptila caerulea        | blue-gray gnatcatcher            | S        | 3        |
| Sialia sialis              | eastern bluebird                 | <u> </u> | 2        |
| Catharus fuscescens        | veery                            | S        | 1        |
| Catharus minimus           | gray-cheeked thrush              | T        | 2        |
| Catharus ustulatus         | Swainson's thrush                | T        | 2        |
| Catharus guttatus          | hermit thrush                    | T        | 2        |
| Hylocichla mustelina       | wood thrush                      | S        | 2        |
| 11 уюсилии тивненти        | WOOG HILUSH                      | ა        | ۷        |

| Turdus migratorius      | american robin               | S | 1  |
|-------------------------|------------------------------|---|----|
| Dumetella carolinensis  | gray catbird                 | S | 1  |
| Mimus polyglottos       | northern mockingbird         | T | 3  |
| Toxostoma rufun         | brown thrasher               | S | 1  |
| Anthus rubescens        | American pipit               | Т | 3  |
| Bombycilla garrulus     | bohemian waxwing             | T | 3  |
| Bombycilla cedrorum     | cedar waxwing                | R | 1  |
| Lanius excubitor        | northern shrike              | T | 2  |
| Lanius ludovicianus     | loggerhead shrike (we, fc2)  | S | 3  |
| Sturnus vulgaris        | European starling            | R | 1  |
| Vireo solitarius        | solitary vireo               | T | 2  |
| Vireo flavifrons        | yellow-throated vireo        | S | 2  |
| Vireo gilvus            | warbling vireo               | S | 2  |
| Vireo philadephicus     | philadelphia vireo           | T | 3  |
| Vireo olivaceus         | red-eyed vireo               | S | 1  |
| Vermivora pinus         | blue-winged warbler          | S | 3  |
| Vermivora chrysoptera   | golden-winged warbler        | S | 2  |
| Vermivora peregrina     | tennessee warbler            | Т | 1  |
| Vermivora celata        | orange-crowned warbler       | Т | 3  |
| Vermivora ruficapilla   | nashville warbler            | T | 1  |
| Parula americana        | northern parula              | Т | 3  |
| Dendroica petechia      | yellow warbler               | S | 1  |
| Dendroica pensylvanica  | chestnut-sided warbler       | S | 2  |
| Dendroica magnolia      | magnolia warbler             | T | 2  |
| Dendroica tigrina       | cape may warbler             | T | 3  |
| Dendroica caerulescens  | black-throated blue warbler  | T | 3  |
| Dendroica coronata      | yellow-rumped warbler        | T | 1  |
| Dendroica virens        | black-throated green warbler | T | 2  |
| Dendroica fusca         | blackburnian warbler         | T | 3  |
| Dendroica pinus         | pine warbler                 | S | 2  |
| Dendroica discolor      | prairie warbler              | S | 3  |
| Dendroica palmarum      | palm warbler                 | T | 2  |
| Dendroica castanea      | bay-breasted warbler         | T | 2  |
| Denroica cerulea        | cerulean warbler (wt, fc2)   | S | 3  |
| Mniotilta varia         | black-and-white warbler      | S | 2  |
| Setophaga ruticilla     | american redstart            | S | 2  |
| Seiurus aurocapillus    | ovenbird                     | S | 1  |
| Seiurus noveboracensis  | northern waterthrush         | T | 2  |
| Seiurus motacilla       | louisiana waterthrush        | S | 3. |
| Oporornis agilis        | connecticut warbler          | T | 3  |
| Oporornis philadelphia  | mourning warbler             | T | 2  |
| Geothylpis trichas      | common yellowthroat          | S | 1  |
| County up to 11 to 1860 | Outhing Jone William         |   |    |

| Wilsonia pusilla                           | Wilson's warbler            | Т            | 3   |
|--|-----------------------------|--------------|-----|
| Wilsonia canadensis                        | Canada warbler              | T            | 3   |
| Piranga olivacea                           | scarlet tanager             | S            | 1   |
| Cardinalis cardinalis                      | northern cardinal           | S            | 1   |
| Pheuticus ludovicianus                     | rose-breasted grosbeak      | S            | 1   |
| Passerina cyanea                           | indigo bunting              | S            | 1   |
| Spiza americana                            | dickcissel                  | S            | 1   |
| Pipilo erythrophthalmus                    | rufous-sided towhee         | S            | 1   |
| Spizella arborea                           | American tree sparrow       | T            | 1   |
| Spizella passerina                         | chipping sparrow            | S            | 1   |
| Spizella pallida                           | clay-colored sparrow        | S            | 2   |
| Spizella pusilla                           | field sparrow               | S            | 1   |
| Pooecetes gramineus                        |                             | <u> </u>     | 1   |
| Chondestes grammacus                       | vesper sparrow lark sparrow | <u>s</u>     | 3   |
| Passerculus sandwichensis                  | savannah sparrow            | S            | 2   |
| Ammodramus savannarum                      |                             | <u>s</u>     |     |
| Ammodramus savannarum Ammodramus henslowii | grasshopper sparrow         | <u>s</u>     | 3 3 |
| Ammodramus leconteii                       | Henslow's sparrow (fc2)     | S S          |     |
|  | Leconte's sparrow           | <u>S</u><br> | 3   |
| Passerella iliaca                          | fox sparrow                 |              | 2   |
| Melospiza melodia                          | song sparrow                | <u>S</u>     | 1   |
| Melospiza lincolnii                        | lincoln's sparrow           | T            | 3   |
| Melospiza georgiana                        | swamp sparrow               | <u> </u>     | 11  |
| Zonotrichia albicollis                     | white-throated sparrow      | <u>T</u>     | 1   |
| Zonotrichia leucophrys                     | white-crowned sparrow       | T            | 2   |
| Zonotrichia querula                        | harris' sparrow             | <u>T</u>     | 3   |
| Junco hyemalis                             | dark-eyed junco             | <u>T</u>     | 1   |
| Calcarius lapponicus                       | lapland longspur            | <u>T</u>     | 2   |
| Plectrophenax nivalis                      | snow bunting                | <u>, T</u>   | 2   |
| Dolichonyz oryzivorus                      | bobolink                    | S            | 2   |
| Agelaius phoeniceus                        | red-winged blackbird        | S            | 1   |
| Sturnella magna                            | eastern meadowlark          | S            | 2   |
| Sturnella neglecta                         | western meadowlark          | S            | 2   |
| Xanthocephalus xanthocephalus              | yellow-headed blackbird     | S            | 3   |
| Euphagus carolinus                         | rusty blackbird             | T            | 2   |
| Euphagus cyanocephalus                     | brewer's blackbird          | T            | 2   |
| Quiscalus quiscula                         | common grackle              | S            | 11  |
| Molothrus ater                             | brown-headed cowbird        | S            | 1   |
| Icterus galbula                            | northern oriole             | S            | 1   |
| Pinicola enucleator                        | pine grosbeak               | T            | 3   |
| Carpodacus purpureus                       | purple finch                | T            | 2   |
| Carpodacus mexicanus                       | house finch                 | R            | 2   |
| Loxia curvirostra                          | red crossbill               | S            | 3   |
|  |                             | <del></del>  |     |

Table 5 (continued)
Birds Potentially Occurring within or near the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin

| Loxia leucoptera           | white-winged crossbill | T | 3 |
|----------------------------|------------------------|---|---|
| Carduelis flammea          | common redpoll         | T | 2 |
| Carduelis hornemanni       | hoary redpoll          | T | 3 |
| Carduelis pinus            | pine siskin            | T | 2 |
| Carduelis tristis          | American goldfinch     | S | 1 |
| Coccothraustes vespertinus | evening grosbeak       | T | 2 |
| Passer domesticus          | house sparrow          | R | 2 |

Notes: <sup>a</sup> Protection category designated by Wisconsin Department of Natural Resources indicating the status of a species in Wisconsin.

WE = endangered WT = threatened

FE = endangered

FT = threatened

FC2 = candidate, under review for listing

<sup>c</sup> Resident status

T = transient (migratory, usually non-breeding season)

S = seasonal (breeding season)

R = resident (year round)

- d Occurrence likelihood
- 1 = very likely to be present
- 2 = likely to be present
- 3 = unlikely to be present

<sup>&</sup>lt;sup>b</sup> Federal protection category designated by the Office of Endangered Species, U.S. Fish and Wildlife Service indicating the biological status of a species in the United States.

breeders. Examples of such species are Bell's vireo (Vireo bellii), white-eyed vireo (Vireo griseus), yellow-throated warbler (Dendroica dominica), blackpoll warbler (Dendroica striata), prothonotary warbler (Protonotaria citrea), worm-eating warbler (Helmitheros vermivorus), Kentucky warbler (Opornis formosus), hooded warbler (Wilsonia citrina), yellow-breasted chat (Icteria virens), summer tanager (Piranga rubra), western tanager (Piranga ludoviciana), sharptailed sparrow (Ammodramus caudacutus), and orchard oriole (Icterus spurius).

2.5.2.4 Mammals. A list of potential and documented mammals species for Hardwood Range and the proposed expansion area is provided in Table 6. The source of the list is the ILUMP for Volk Field and the Hardwood Range (TN&Associates, Inc. 1994). The authors of the ILUMP consulted many sources in compiling this list, including Jackson (1961) for Wisconsin distributions and Jones and Birney (1988) for recent regional distributions. An unpublished report on a small mammal survey of Portage, Wood, Juneau, and Adams Counties (Wydeven et al. 1975) and a limited list from Fort McCoy for local distributional data on some small mammal species were also examined and the results incorporated. The original ILUMP was consulted and interviews conducted with those Volk Field personnel who contributed information to it. Experts, on the status of mammals in Wisconsin, were also consulted and they provided useful information. The diversity of mammal species, as is true of other taxa, reflects the transitional nature of the area, incorporating species with western, northern, and southern affinities. Likelihood codes for mammal species of Hardwood Range and proposed expansion area were assigned with values ranging from 1 (highest likelihood) to 3 (lowest likelihood). These rankings represent a synthesis of available information, but are subject to revision as more documentation is made available.

#### 2.6 FOREST RESOURCES

Most of the forests contained within the Hardwood Range and the proposed expansion area are county forest lands. The State Legislature in 1927 passed the Forest Crop Law that authorized counties to create county forests. Both Wood and Juneau Counties have significant acreage of county forest holdings including areas within the Hardwood Range and proposed expansion

Table 6
Mammals Potentially Occurring within the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin

| Scientific Name                | Species (Status <sup>a</sup> ) | Occurrence<br>Likelihood <sup>b</sup> |
|--------------------------------|--------------------------------|---------------------------------------|
| Didelphis virginiana           | virginia opossum               | 1                                     |
| Sorex arcticus                 | arctic shrew (wsc)             | 2                                     |
| Sorex cinereus                 | masked shrew                   | 1                                     |
| Sorex hoyi                     | pygmy shrew (wsc)              | 1                                     |
| Blarina brevicauda             | northern short-tailed shrew    | 1                                     |
| Scalopus aquaticus             | eastern mole                   | 1                                     |
| Condylura cristata             | star nosed mole                | 2                                     |
| Myotis lucifugus               | little brown myotis            | 1                                     |
| Myotis septentrionalis         | northern myotis                | 2                                     |
| Lasionycteris noctivagans      | silver-haired bat              | 1                                     |
| Pipistrellus subflavus         | eastern pipistrelle            | 2                                     |
| Eptesicus fuscus               | big brown bat                  | 1                                     |
| Lasiurus borealis              | red bat                        | 1                                     |
| Lasiurus cinereus              | hoary bat                      | 1                                     |
| Sylvilagus floridanus          | eastern cottontail             | 1                                     |
| Lepus americanus               | snowshoe hare                  | 2                                     |
| Tamias minimus                 | least chipmunk                 | 2                                     |
| Tamias striatus                | eastern chipmunk               | 1                                     |
| Marmota monax                  | woodchuck                      | 1                                     |
| Spermophilus tridecemlineatus  | thirteen-lined ground squirrel | 1                                     |
| Sciurus carolinensis           | gray squirrel                  | 1                                     |
| Sciurus niger                  | fox squirrel                   | 1                                     |
| Tamiasciurus hudsonicus        | red squirrel                   | 1                                     |
| Glaucomys volans               | southern flying squirrel       | 1                                     |
| Castor canadensis              | beaver                         | 1                                     |
| Reithrodontomys megalotis      | western harvest mouse          | 2                                     |
| Peromyscus leucopus            | white-footed mouse             | 1                                     |
| Peromyscus maniculatus bairdii | prairie deer mouse             | 1                                     |
| Clethrionomys gapperi          | southern red-backed vole       | 2                                     |
| Microtus ochrogaster           | prairie vole                   | 2                                     |
| Microtus pennsylvanicus        | meadow vole                    | 1                                     |
| Microtus pinetorum             | woodland vole                  | 1                                     |
| Ondatra zibethicus             | muskrat                        | 1                                     |
| Synaptomys cooperi             | southern bog lemming           | 1                                     |
| Mus musculus                   | house mouse                    | 1                                     |

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| Scientific Name          | Species (Status <sup>a</sup> ) | Occurrence<br>Likelihood <sup>b</sup> |
|--------------------------|--------------------------------|---------------------------------------|
| Rattus norvegicus        | norway rat                     | 1                                     |
| Zapus hudsonius          | meadow jumping mouse           | 1                                     |
| Napaeozapus insignis     | woodland jumping mouse         | 2                                     |
| Erethizon dorsatum       | porcupine                      | 2                                     |
| Canis latrans            | coyote                         | 1                                     |
| Vulpes vulpes            | red fox                        | 1                                     |
| Urocyon cinereoargenteus | gray fox                       | 1                                     |
| Ursus americanus         | black bear                     | 2                                     |
| Procyon lotor            | raccoon                        | 1                                     |
| Mustela erminea          | ermine (short-tailed weasel)   | 1                                     |
| Mustela frenata          | long-tailed weasel             | 1                                     |
| Mustela nivalis          | least weasel                   | 1                                     |
| Mustela vision           | mink                           | 1                                     |
| Taxidea taxus            | badger                         | 2                                     |
| Mephitis mephitis        | striped skunk                  | 1                                     |
| Lutra canadensis         | river otter                    | 2                                     |
| Felis rufus              | bobcat                         | 3                                     |
| Odocoileus virginianus   | white-tailed deer              | 1                                     |

Notes: \* WSC = Designated by Wisconsin as a Special Concern species.

1 = very likely

2 = likely

3 = unlikely

<sup>&</sup>lt;sup>b</sup> Occurrence Likelihood

area. The county forests are managed in accordance with a 10-Year Comprehensive Land Use Plan developed by the county with assistance of WDNR. The purpose of the county forests is:

To provide the basis for a permanent program of county forests to enable and encourage the planned development and management of the county forests for optimum production of forest products, together with recreational opportunities, wildlife, watershed protection and stabilization of stream flow, giving full recognition to the concept of multiple use to assure maximum public benefits; to protect the public rights, interests and investments in such lands; and to compensate the counties for the public uses, benefits and privileges these lands provide; all in a manner which will provide a reasonable revenue to the towns in which such lands lie (County Forest Law, s. 28.11 Wisconsin Statutes).

Participating counties are given a state payment of county forestry aid that is intended solely for development of the county forest. In return for the aid, the state collects a 20 percent severance tax on gross sales from the forest.

The private forested properties in the area are somewhat less intensively managed. Many of these properties are managed for recreation or wildlife either passively or using silvicultural prescriptions (forest management). One property within the expansion area is cleared and used for cranberry production.

#### 2.6.1 Forest Cover Types and Composition

As discussed above, the Hardwood Range and proposed expansion area lie within the transition zone. This transition zone, or ecotone, contains a blending of plant species from both provinces with southern species approaching their northern range limits and northern species approaching their southern limits.

The major forest cover types within the Hardwood Range and proposed expansion area are aspen, jack pine-northern pin oak-black oak, and red pine-white pine. Wet forests typically

contain aspen or jack pine, mesic forests may contain aspen or jack pine-northern pin oak-black oak, and xeric forests contain red pine-white pine (as plantations) or jack pine-northern pin oak-black oak. In addition, a fourth forest cover type is beginning to appear on the areas of the Hardwood Range that are not harvested - red maple. As wet and mesic stands continue to age, in the absence of harvest and fire, more red maple stands are expected.

#### 2.6.2 Current Management

In general, county forests are maintained to provide a sustained yield of timber while also providing recreation, wildlife, water quality, aesthetic, soil conservation, and other benefits. Forest management plans are developed by county or WDNR staff who are trained in silvicultural principles. These staff apply economic, biological and environmental considerations to the planning process and utilize existing WDNR guidelines. These guidelines include the Forest Aesthetic and Silvicultural Handbook (No. 2531.5) and the Compartment Reconnaissance Handbook (No. 2412).

Silvicultural prescriptions differ within each of the three dominant forest cover types. The aspen stands are managed on a 40 to 45 year rotation. Aspen stands are clear-cut and then allowed to naturally regenerate. The jack pine-northern pin oak-black oak are managed on a 45 to 50 year rotation. Jack pine-northern pin oak-black oak stands are also clear-cut. Given proper site conditions (not too wet and not too dry), these stands will regenerate naturally. The more extreme sites, however, may be direct-seeded to jack pine or planted with red and/or white pine. The red pine-white pine stands are managed on a 90 to 100 year rotation. Ideally, these stands are first thinned at 25 to 30 years and then every 10 to 15 years thereafter until they are clear-cut and replanted.

The aspen and jack pine-northern pin oak-black oak forest cover types account for most of the timber harvested in the area. The harvested timber is used primarily for pulpwood at local paper mills in Port Edwards, Nekoosa, and Wisconsin Rapids. Red pine, white pine, and low-quality oak saw timber are only occasionally harvested in the area.

Currently at the Hardwood Range, timber harvest is restricted to stands along the north and south periphery and the far eastern edge of the site. Interior areas were historically harvested, but metal fragments (from shattered ordnance) are often embedded in trees in this area. The presence of fragments makes the wood less desirable to loggers and local paper mills. As expected, these unharvested areas are beginning to succeed from pioneer communities (i.e., aspen, jack pinenorthern pin oak-black oak) to later successional communities (i.e., red maple). Anticipating the species composition and structure of these aging communities will be an important consideration in developing future management plans.

#### 2.7 THREATENED, ENDANGERED AND OTHER SPECIAL STATUS SPECIES

Rare species and natural communities found within and/or near the Hardwood Range and the proposed expansion area were identified by WDNR Bureau of Endangered Resources from the NHI database (Table 7). Rare species include: federal- and state-designated endangered and threatened species; those species proposed for federal listing as endangered or threatened, federal candidate species (under review for listing); and special concern (watch) species. Special concern species are WDNR-designated species about which some problem of abundance or distribution is suspected but not yet proved. The NHI database contains information on the documented occurrences of rare species statewide. The potential that the WDNR-identified species exist within the Hardwood Range and proposed expansion area was estimated by examining preliminary information on available habitat in the area and consultation with WDNR and United States Fish and Wildlife Services (USFWS) personnel. This estimate is presented on Table 7 as an 'Occurrence likelihood'. An occurrence likelihood of "1" indicates a species that is very likely present in the area, "2" indicates a species that is likely present in the area, and "3" indicates a species that is unlikely to be present in the area.

A review of the WDNR species list and discussions with USFWS indicate that the area has not been rigorously inventoried. Only the Karner blue butterfly (Lycaeides melissa samuelis, state

Table 7
Threatened, Endangered, and Other Special Status Species Recorded near the Hardwood Range and Proposed Expansion Area
Juneau and Wood Counties, Wisconsin

| Species                                | Common Name                 | WI<br>Status <sup>a</sup> | US<br>Status <sup>b</sup> | Occurrence<br>Likelihood |
|--|-----------------------------|---------------------------|---------------------------|--------------------------|
|  |                             | Duttes                    | Ditti                     | 15memoou                 |
| Plants                                 |                             |                           |                           |                          |
| Arabis missouriensis var.<br>deamii    | Missouri rock cress         | SC                        | C2                        | 2                        |
| Arethusa bulbosa                       | dragon's mouth              | SC                        | None                      | 2                        |
| Asclepias lanuginosa                   | wooly milkweed              | THR                       | None                      | 2                        |
| Bartonia virginica                     | screwstem                   | SC                        | None                      | 2                        |
| Calamagrostis stricta ssp. inexpansa   | bog reed grass              | SC                        | None                      | 2                        |
| Carex cumulata                         | clustered sedge             | SC                        | None                      | 2                        |
| Carex livida var. radicaulis           | livid sedge                 | SC                        | None                      | 2                        |
| Didiplis diandra                       | water purslane              | SC                        | None                      | 2                        |
| Eleocharis engelmannii                 | Engelmann spike-rush        | SC                        | None                      | 2                        |
| Festuca paradoxa                       | cluster fescue              | SC                        | None                      | 2                        |
| Malaxis brachypoda                     | white adder's-mouth         | SC                        | C2                        | 2                        |
| Myriophyllum farwellii                 | Farwell's water-milfoil     | SC                        | None                      | 3                        |
| Ophioglossum vulgatum var. pseudopodum | adder's-tongue              | SC                        | None                      | 2                        |
| Opuntia fragilis                       | brittle prickly-pear        | THR                       | None                      | 3                        |
| Orobanche uniflora                     | one-flowered broomrape      | SC                        | None                      | 2                        |
| Platanthera flava var. herbiola        | tubercled orchid            | THR                       | None                      | 2                        |
| Poa paludigena                         | bog bluegrass               | THR                       | C2                        | 2                        |
| Polygala cruciata                      | cross milkwort              | SC                        | None                      | 2                        |
| Potamogeton confervoides               | algal-leaved pondweed       | THR                       | C2                        | 3                        |
| Potamogeton vaseyi                     | vasey's pondweed            | SC                        | None                      | 3                        |
| Utricularia geminiscapa                | twin-stemmed<br>bladderwort | SC                        | None                      | 3                        |
| Rhexia virginica                       | meadow beauty               | SC                        | None                      | 2                        |

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### Table 7 (continued)

# Threatened, Endangered, and Other Special Status Species Recorded near the Hardwood Range and Proposed Expansion Area Juneau and Wood Counties, Wisconsin

| Invertebrates                 |                                 |      |      |     |
|-------------------------------|---------------------------------|------|------|-----|
| Aeshna verticalis             | green-striped darner            | SC   | None | 3   |
| Atrytonopsis hianna           | dusted skipper                  | SC   | None | 2   |
| Erynnis persius persius       | Persius dusky wing              | SC   | None | ì   |
| Hemileuca maia                | buck moth                       | SC   | None | 2   |
| Hesperia leonardus leonardus  | Leonard's skipper               | SC   | None | 1   |
| Incisalia irus                | frosted elfin                   | THR  | None | 1   |
| Incisalia polia               | hoary elfin                     | SC   | None | 1   |
| Lycaeides melissa samuelis    | Karner blue butterfly           | SC   | LE   | 1   |
| Satyrium liparops strigosum   | striped hairstreak              | SC   | None | 1   |
| Somatochlora incurvata        | warpaint emerald                | SC   | None | 2   |
| Somatochlora tenebrosa        | clamp-tipped emerald            | SC   | None | 2   |
| Fish                          |                                 |      |      | • • |
| Aphredoderus sayanus          | pirate perch                    | Rule | None | 1   |
| Clinostomus elongatus         | redside dace                    | Rule | None | 3   |
| Etheostoma clarum             | western sand darter             | Rule | None | 3   |
| Lythrurus umbratilis          | redfin shiner                   | THR  | None | 1   |
| Reptiles and Amhibians        |                                 |      |      |     |
| Clemmys insculpta             | wood turtle                     | THR  | None | 3   |
| Emydoidea blandingii          | Blanding's turtle               | THR  | C2   | 1   |
| Ophisaurus attenuatus         | western slender glass<br>lizard | END  | None | 2   |
| Sistrurus catenatus catenatus | eastern massasauga              | END  | C2   | 1   |

#### Table 7 (continued)

### Threatened, Endangered, and Other Special Status Species Recorded near the Hardwood Range and Proposed Expansion Area Juneau and Wood Counties, Wisconsin

| Birds                    |                                |      |      |   |
|--------------------------|--------------------------------|------|------|---|
| Accipiter cooperii       | Cooper's hawk                  | Rule | None | 2 |
| Buteo lineatus           | red-shouldered hawk            | THR  | None | 1 |
| Casmerodius albus        | great egret                    | THR  | None | 3 |
| Dendroica cerulea        | cerulean warbler               | THR  | C2   | 3 |
| Empidonax virescens      | acadian flycatcher             | THR  | None | 3 |
| Haliaeetus leucocephalus | bald eagle                     | THR  | LELT | 3 |
| Nyctanassa violacea      | yellow-crowned night-<br>heron | THR  | None | 3 |
| Pandion haliaetus        | osprey                         | THR  | None | 3 |
| Tympanuchus cupido       | greater prairie-chicken        | THR  | None | 3 |
| Tyto alba                | barn owl                       | END  | None | 3 |

Notes: <sup>a</sup> Protection category designated by Wisconsin Department of Natural Resources indicating the status of a species in Wisconsin.

END = endangered

THR = threatened

Rule = protected or regulated by some other state or federal legislation or policy (e.g., Migratory Bird

Treaty Act, hunting regulations)
PEND = proposed endangered

PTHR = proposed threatened

SC = special concern

LE = listed endangered

LT = listed threatened

LELT = listed endangered in part of its range, threatened in a different part

PE = proposed endangered

PT = proposed threatened

PEPT = proposed endangered in part of its range, threatened in a different part

None = no laws regulating use

C1 = candidate, proposed for listing

C2 =species of concern

1 = very likely

2 = likely

3 = unlikely

<sup>&</sup>lt;sup>b</sup> Federal protection category designated by the Office of Endangered Species, U.S. Fish and Wildlife Service indicating the biological status of a species in the United States.

<sup>&</sup>lt;sup>c</sup> Occurrence Likelihood

special concern, federal endangered) has been reported on the existing Hardwood Range. The Karner blue butterfly is known to exist within the southern portion of the target complex at the Hardwood Range. Only the striped hairstreak (*Satyium liparops strigosum*, special concern) has been reported within the proposed expansion area.

Of the rare species identified by WDNR as occurring in the area, habitat for only a subset of these species likely exists within the Hardwood Range. Many special status species are considered 'likely present' (see Table 7). However, this determination results from of a lack of information on the species or it's preferred habitat and an attempt to err on the side of caution. Additional state- and federally-listed threatened and endangered species that are most likely present within the Hardwood Range and the proposed expansion area include the eastern massasauga rattlesnake (state endangered, federal candidate), red-shouldered hawk (Buteo lineatus, state threatened) Blanding's turtle (state threatened, federal candidate), redfin shiner (state threatened), and the frosted elfin (Incisalia irus, state threatened). In addition, several special concern species are often associated with the Karner blue butterfly and their habitat, including: hoary elfin (Incisalia polia); striped hairstreak; and Persius dusky wing (Erynnis persius persius).

#### 2.8 OUTDOOR RECREATION

The area of the Hardwood Range and the proposed expansion area offer a diversity of outdoor recreational opportunities. Most of the Hardwood Range, other than the target complex and immediately adjacent areas, is part of the Juneau County Forest. The Juneau County Forest is the major component of the county's recreational resources.

Currently most of the Hardwood Range is posted with signs that warn the public of the danger of entering the area. The signs also state that entry is allowed if given permission from the facility commander or during the nine day gun deer season. The only other access control methods are gates at roads that lead into the Hardwood Range. People who regularly use the range for outdoor activities seem to use areas at the far east end of the range or they contact facility personnel at the range building complex to check the flight schedule before entering other areas

of the range. During the nine day deer season, the facility is open to hunters. During this period, flights still take place but no ordnance is dropped or fired.

The proposed expansion area consists primarily of Wood County Forest lands that are open for recreation. The Wood County Forest is the major component of the county's recreational resources. Only one recreational facility exits within the proposed expansion area - a snowmobile trail. The trail generally is aligned north-south along the boundary of Remington and Port Edwards Townships from Babcock to County Line Road. It then proceeds east along County Line Road (along the north edge of the Hardwood Range) to a point one mile east of the Hardwood Range. In addition to this county trail, a club trail connects with the county trail on County Line Road and proceeds west then south on Tenth Street to County Highway F and west into Finley.

The private lands within the proposed expansion area are used primarily for forestry, passive recreation, and cranberry production.

The specific types of outdoor recreation activities that occur on the Hardwood Range and within the proposed expansion area probably include:

- Hunting for big and small game
- Primitive camping
- Sightseeing, hiking, nature study, berry picking
- Visiting historic and archaeological sites
- Snowmobiling on snow-covered roads or designated trails
- All terrain vehicle (ATV) riding
- Target shooting
- Horseback riding
- Cross-country skiing
- Bicycling

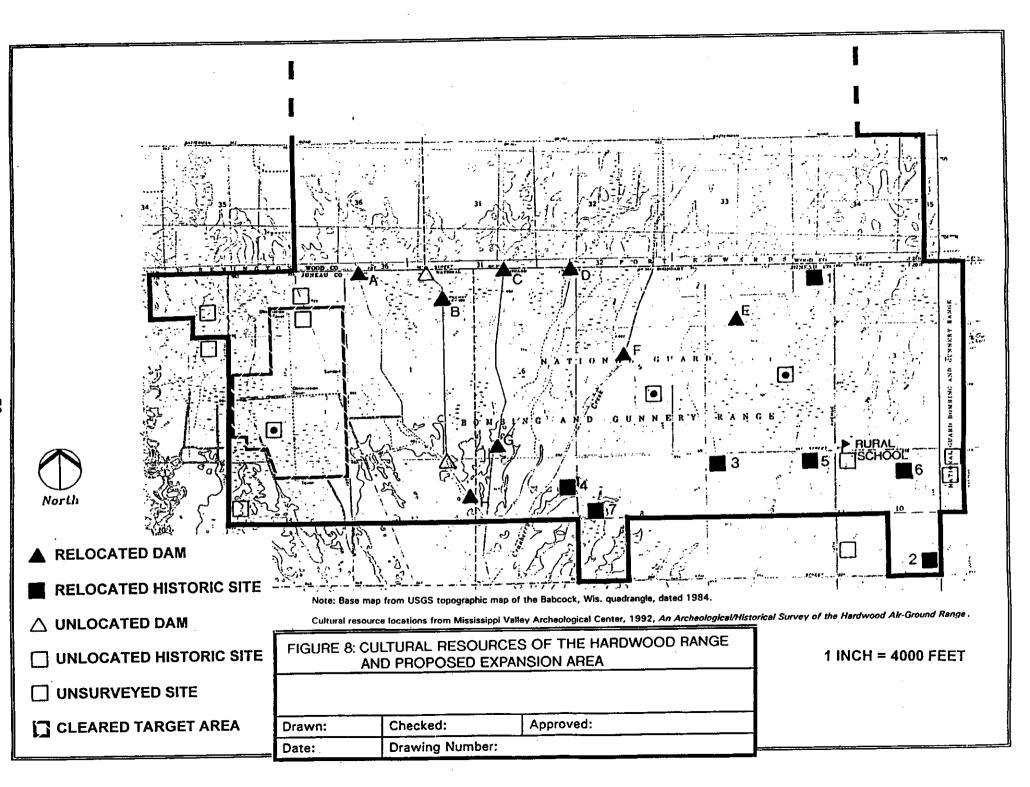
Most of these activities qualify as, or are currently being practiced as, passive recreation. Passive recreation is a pursuit which involves a minimal amount of facility development. Several of these activities, however, could benefit from facility development and thereby become active recreation. For example, snowmobiling, horseback riding, bicycling, target shooting, and cross-country skiing can benefit from and be encouraged by facility development. However, many of these activities already benefit from forest management practices. For example, hunters, mountain bikers, ATV riders, and others currently make use of existing logging roads in the area.

#### 2.9 CULTURAL RESOURCES

Resources of historical, architectural, cultural, or archeological importance are limited, non-renewable portions of the human environment. These remnants of our past are protected to prevent an irretrievable loss of our heritage. They are often referred to collectively as "cultural resources." An historical resources overview (United States West Research 1992) identified 12 historic farmsteads and a rural school house dating from 1870 to 1914 within Hardwood Range (Figure 8). These buildings were razed for the range installation. Other historic features that were documented in the United States West overview included drainage and logging features, such as the Yellow River Improvement Company Canal, the Yellow Pinery Road, Cranberry Creek Drainage District System and WPA Water Control Dams from the 1930s.

A subsequent survey conducted in 1992 by the Mississippi Valley Archaeological Center (MVAC) (1992) concentrated on areas known from the overview to potentially contain historic resources. Although seven historic farmsteads were located, including five of the six noted in 1954, none of the associated structures remained standing, and these are considered non-eligible archaeological sites. However, eight historic dams were documented, and these are considered potentially eligible (MVAC 1992) (Figure 8).

Hardwood Range includes 11 structures built for range operation, including: three towers; training, storage and equipment buildings; a helicopter pad; a well; a diesel storage tank; and a



fence. The earliest of these facilities was constructed in 1958 (United States West Research 1992); none have been evaluated for National Register eligibility.

No National Register historic architectural properties are located on the existing range or within the proposed area of range expansion. The existing Hardwood Range is not considered sensitive for historic architectural resources, as this category of resources has been well-researched. The proposed expansion area is moderately sensitive for such resources, as it may contain additional farmsteads, farming-related features, or sites associated with drainage or logging activities, similar to those on the existing range. Based on previous research, including the research and surveys conducted by Mississippi Valley Archaeology Center, there are no known traditional resources within the Hardwood Range. Although the range is not known to include such resources, prehistoric petroglyph and mound sites are found near the range. These site types may be associated with traditional cultural practices. In addition, the historic presence of Menominee and Winnebago groups in the nineteenth and early to mid-twentieth centuries raises the possibility of the presence of traditional resources on Hardwood Range. Because of the combination of these factors, the Hardwood Range has a moderate sensitivity for traditional Native American resources.

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#### 3.0 LAND USE MANAGEMENT GUIDELINES

This section presents: planning assumptions and constraints, general facility-wide management goals and guidelines; and specific management guidelines for the site natural resources in the event that the range expansion takes place. The resources include: soils; water; fish and wildlife; forest; threatened, endangered and other special status species; outdoor recreation; and cultural. Within each of these resource subsections, management goals and guidelines, and research needs will be presented.

#### 3.1 PLANNING ASSUMPTIONS AND CONSTRAINTS

The following are lists of planning assumptions and constraints within which the management goals and guidelines were developed.

Planning Assumptions:

- 1. This Management Guidelines document will provide interim guidance for management direction should the proposed expansion take place and before an ILUMP can be completed. Should the expansion take place, an ILUMP would be developed by a task force of local, state, and federal natural resource professionals. ILUMP development would be led and coordinated by Air National Guard personnel.
- 2. It has not been determined how the land for the range expansion would be obtained in the event that the expansion takes place. For example, the range may be either fee-owned or leased by the United States government.
- 3. Existing state and federal land use and management plans exist for nearby sites (i.e., Necedah National Wildlife Refuge, Wood and Juneau County Forests, Sandhill Wildlife Area). The management philosophy and practices for the Hardwood Range and proposed expansion area, would generally be in agreement with these plans to create uniform management across the landscape. The unacceptable alternative is opposing plans that exist within man-made boundaries.

# Planning Constraints:

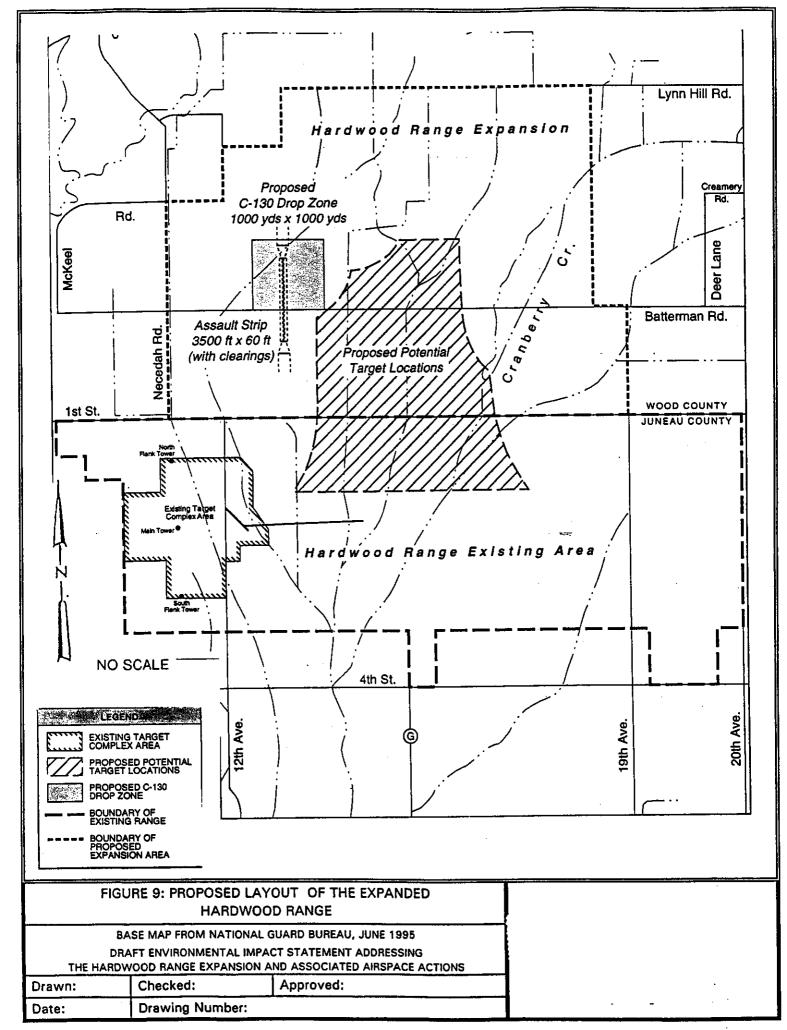
- 1. The management guidelines described in this document must be compatible with the Hardwood Range Mission and the planned expansion to the maximum extent possible. A general plan for the expanded range is included on Figure 9.
- Not all management activities may be completed within the time frame of this document because of uncertainties in funding and personnel availability. Therefore, prioritization of management activities will need to be completed to develop implementation strategies that work within these constraints.
- 3. All activities must adhere to federal laws and regulations. For example, significant actions will require adherence to the rules of NEPA, ESA, and/or the CWA. An attempt will be made to meet requirements of local and state laws and regulations.

#### 3.2 MANAGEMENT GOAL AND DIRECTION

This section presents the goal of land use management planning at the expanded Hardwood Range; the overall management direction for the expanded Hardwood Range; facility-wide management guidelines; and land use management alternatives that have been considered and rejected.

### 3.2.1 Management Goal

The management goal presented here defines a broad, overall natural resources management standard for land use management planning and implementation within the constraints of the military mission at the expanded Hardwood Range. The overall goal of land use management at the expanded Hardwood Range will be to maintain ecosystem viability and biological diversity (biodiversity) through an integrated natural resource management program. These Management Guidelines will ensure that resource values, uses, products, and services are produced in harmony with restoring and maintaining the long-term sustainability, diversity, and productivity



of the ecosystem. Only those activities that are consistent with the management goal and are also considered the highest and best land uses for the expanded Hardwood Range are recommended.

# 3.2.2 Facility-Wide Management Direction

Preparing a plan that truly integrates natural resource management is a difficult task for many reasons. Different management philosophies exist pertaining to natural resource management on public lands. These philosophies and their resulting management practices are often different or in complete opposition to one-another. For example, while some groups would prefer to see forested areas preserved, others would promote the use of renewable resources such as timber. In the past, and to a certain extent today, resource managers have selected and managed for a single or small group of species based upon their perceived importance. However, this sort of management has severe limitations. The health of a single species seldom acts as a good surrogate for the health of an entire ecosystem. In fact, this management often favors only a few species at the expense of overall ecosystem health and biodiversity. Therefore, an effective multiple-use plan will vary the intensity level of management practices over the scales of time and space. Continuous monitoring of the affects of management activities on the site ecosystems will allow for constructive plan modifications to be made in response to adverse practices.

This is not to say that forest management, wildlife management, and outdoor recreation management will not be practiced at the expanded Hardwood Range. To the contrary, these activities will be planned, reviewed, and implemented by an interdisciplinary task force at intensity levels that are not detrimental to the ecosystem as a whole. Ecosystem function and viability in effect will become the standards against which proposed management activities and their impacts are evaluated, and if appropriate, implemented.

Biological diversity will be defined as the variety and variability among living organisms and the ecological complexes in which these organisms occur. This term encompasses different levels of biological organization, including communities, species, populations, individual organisms, and genes, while spatial contexts range from home ranges to the biosphere (Office of Technology Assessment 1987). Scott *et al.* (1995) identified the following requirements for maintenance of biodiversity:

- genetic variation within and between populations of species,
- native species in numbers and distributions that provide high likelihood of long-term continued existence,
- integrity of biological communities and their structural and functional characteristics, and
- variety in the kinds of ecosystems, their patterns, and linkages across regional landscapes.

The geographic scale at which biodiversity is maintained is critical. Management practices that contribute to maintaining viable populations of native species should be encouraged. Whereas, those practices designed to increase diversity on a local scale will be discouraged. Therefore, management planning will be completed on a landscape scale to minimize the effects of fragmentation. For example, it will not be desirable to maximize the diversity of vegetational stages within forest types at the expanded Hardwood Range. Maximizing diversity in this manner tends to favor those species associated with early to mid-successional stages or edge species that have a wide range of habitat tolerance (generalists, i.e., white-tailed deer). It is desirable, however, to create a balance in forest stands in terms of their species composition, age, and area over the landscape. This approach involves restoring, maintaining and/or preserving some late successional stages or edaphically-controlled communities (i.e., pine barrens) to provide habitat for species with more restrictive habitat requirements (i.e., habitat interior species). Indeed, it will be difficult to implement a landscape-scale management plan given the military mission and area constraints within a forested landscape with fragmented ownership. Therefore, plan development and implementation will involve cooperating local, state and federal agencies, private groups, and neighboring landowners to reduce the affect of the human construct, and in essence, increase the size of the management area. This level of cooperation will allow for ecosystem management along natural boundaries, such as watersheds, rather than along arbitrarily delineated lines. The expanded Hardwood Range would be an ideal location in which to initiate this type of management strategy since the area is bounded by, or is near, thousands of acres of county, state, and federal lands.

As discussed in Section 2.0, the Hardwood Range area is currently most intensively used for pulp production (forest management) and recreation. Historic land uses, including forest management and agricultural practices, are primarily responsible for the current forest composition and structure; the wildlife species present (including rare species); and to some extent, the recreational opportunities the area provides. In general, soils in the area are not well suited for other intensive uses. Therefore, forest management will continue to be the primary management tool to achieve the desired forest structures and diversity while producing an acceptable level of goods. Forest planning and management will be done within the constraints of the military mission and the established goals of ecosystem viability and biodiversity for the expanded Hardwood Range.

Given this management direction, the initial management activities will involve primarily data gathering on the resources at the expanded Hardwood Range and the establishment of an interdisciplinary task force that includes representatives of local, state, and federal agencies, private groups, and local landowners to facilitate preparation of an ILUMP. After a task force is established, preparation of the ILUMP will begin with identifying a uniform method of ecological land classification. Data gaps will also be identified. Once the classification system is developed or an existing system adopted, the ecosystem management process can begin. Data gaps will be filled by biological inventories - the starting point for any management plan. A biological survey was completed for the Hardwood Range and proposed expansion area in 1996 Scott et al. (1995) the identified steps to the inventory process are:

- 1. Compile lists of plant and animal species, their numbers, habitat affinities, and distribution patterns, and community types, their area, and distribution patterns;
- 2. for each community, existing and potential successional stages should be identified and mapped;
- 3. the extent and severity of human disturbances should be assessed; and

4. ongoing actives should be monitored.

Comparison of the factors listed above with historical conditions, will allow for a quantitative assessment of the current level of diversity to be completed and goals for the future level of diversity to be established.

# 3.2.3 Land Use Alternatives that were Investigated and Dismissed

Discussed below are two additional potential land use options that were investigated but are most likely not viable options for the reasons listed.

- Agriculture. The soils in the area are generally not well-suited for agriculture, with three exceptions Plainfield and Friendship soils that are equipped with an irrigation system and Newson soils for cranberry production. The potential exists that range buffer areas could be leased for agricultural uses. Initiation of either of these operations (rowcrop or cranberry production) at the expanded Hardwood Range would involve an initial significant monetary investment on the part of the lessee and/or the government and a significant impact to the existing character of the land. When combined the additional adverse impacts such as soil erosion, changes to the hydrology of the area, fragmentation and loss of large forested areas for wildlife and recreation, and potential impacts from pesticides and fertilizer applications, agricultural uses do not seem consistent with the goals of this plan.
- Grazing. Controlled grazing is a commonly used range management technique. However, it is probably not a prudent alternative for the expanded Hardwood Range. There is currently not a market for grazing leases in the area of the Hardwood Range because the soils and plant communities do not produce the quality and tonage of forage species necessary to make leasing grazing rights cost effective. In addition, grazing at the expanded Hardwood Range would potentially be in conflict with some of the existing land uses such as forestry, recreation, and soil management.

# 3.3 MANAGEMENT GUIDELINES

This section presents the Management Guidelines developed for the expanded Hardwood Range.

# 3.3.1 Soil Management

Soil is the base of any ecosystem, and damage to the soil will affect all other parts of the ecosystem. The overall goal of soil management is to protect, maintain, and improve the expanded Hardwood Range soil fertility, structure, and quality. Soil management at the Hardwood Range and proposed expansion area should, therefore, include implementation of methods to reduce erosion, maintain soil fertility, and reduce the potential for soil contamination.

The following is a list of Management Guidelines related to soil management:

- Natural resource management activities will be planned, designed, and implemented to comply with all applicable laws, regulations, and standards that ensure soil loss and site degradation are minimized.
- 2. Begin preliminary soil mapping activities. The results of mapping will facilitate wetland identification, forestry, and wildlife management planning.
- 3. Identify erosion prone soils and sites at the expanded Hardwood Range. Inspect these areas regularly and develop and implement mitigation measures as necessary.
- 4. Install and maintain native tree, shrub or grass windbreaks at right angles to the prevailing winds in areas that will be subjected to clearing and/or intensive use (i.e., the target complex). Consult NRCS representatives and publications to determine species and spacing of windbreaks.
- 5. Hazardous materials may be stored in areas with primary and secondary containment to minimize the potential for spills and contamination of soil. In the instance of chemical spills, prompt containment and clean-up response is mandatory to minimize soil

contamination. A spill response plan is required and will be prepared and/or updated as necessary.

- 6. Slash from logging operations should be left within the limits of the cut to protect soils from erosion and maintain soil fertility.
- 7. Re-vegetate with native species, or use an inert material for mulch, immediately after any construction or accidental damage to avoid erosion of bare soil.

# 3.3.2 Water Resource Management

The overall goal of water resource management is to protect, maintain, and improve water quality and quantity. Therefore, water resource management at the expanded Hardwood Range should include activities that protect the site wetlands, waterbodies and floodplains from siltation, modification, and contamination.

The following is a list of Management Guidelines related to water resource management:

- Manage wetlands, streams and associated riparian zones, and floodplains to protect or enhance their overall value while complying with all applicable local, state, and federal laws and regulations.
- Wetlands at the Hardwood Range have been remotely identified and delineated by National Wetland Inventory. Complete similar mapping for the expansion area. Verify location and classification of remotely-identified wetlands in the field.
- 3. Plan silvicultural operations (i.e., cuts, road building) to protect wetlands and water bodies. Establish and maintain permanent vegetative buffer strips around wetlands and water bodies.

4. Coordinate all projects near wetlands and water bodies with WDNR and USACE to ensure water quality standards will be met.

# 3.3.3 Fish and Wildlife Management

The overall goal of fish and wildlife management is to manage game and nongame fish and wildlife species and their habitats within the guidelines of ecosystem management. Therefore, fish and wildlife management at the expanded Hardwood Range should include implementation of activities that are consistent with the principles of promoting biodiversity rather than emphasizing species-specific management activities.

Fish and wildlife management is the application of ecological knowledge to populations of animals and their plant associates. Three basic approaches to fish and wildlife management are commonly implemented: (1) preservation by allowing nature to take its course without human intervention; (2) direct manipulation of animal populations by trapping, shooting, poisoning, and stocking; and (3) indirect manipulation of animal populations by altering the vegetation present.

The following is a list of Management Guidelines related to fish and wildlife management:

- 1. In coordination with, or as part of a cooperative agreement with the WDNR and the United States Fish and Wildlife Service, survey for the presence and abundance of select game and nongame fish and wildlife species (i.e., breeding bird surveys, December and May bird counts, ruffed grouse drumming surveys, spring gobbler counts, summer turkey brood surveys, and white-tailed deer fawn counts). Survey procedures and methodologies should follow those of the cooperating agency. Disseminate survey results to cooperating agencies.
- 2. Continually refine existing lists of plant and animal species that inhabit the area. Identify for each species their numbers, habitat affinities, and distribution patterns.

- 3. Develop or adopt an appropriate land classification system that identifies the range of successional pathways for each community within the landscape.
- 4. Continually refine lists of community types, their area, distribution patterns, and existing and potential successional stages.
- 5. Utilize forestry, prescribed burning and other methods to create a balance in seral stages for each community type. Maintain sufficient community patch size to attract and maintain populations of interior species. Restore and manage edaphically-controlled communities such as jack pine and oak barrens on suitable soils.
- 6. Monitor the impacts of military activities and other management activities (i.e., silvicultural practices, recreational use) on game and nongame species.
- 7. Identify, protect, and maintain critical habitat types to support game and nongame species.
- 8. Review and coordinate management strategies with cooperating/regulatory agencies prior to implementation.
- Encourage fish and wildlife research and management activities at the expanded Hardwood Range by establishing Cooperative Plan Agreements with local, state, and/or federal resource management agencies.
- 10. Allow hunting and trapping at the expanded Hardwood Range within the constraints of the military mission and state and federal hunting and trapping regulations. Coordinate enforcement activities with local WDNR Conservation Wardens. Develop and implement a strategy to monitor hunting and trapping activities and their associated impacts.

# 3.3.4 Forest Management

The overall goal of forest management is planned development and management of the facility's forests for optimum production of forest products, together with recreational opportunities, wildlife, watershed protection and stabilization of stream flow, giving full recognition to the concept of multiple use to assure maximum public benefits.

The following is a list of Management Guidelines related to forest management:

- 1. Conduct planning and operational management activities on a landscape scale.
- 2. Produce a variety of forest products utilizing multiple-use and sustained yield concepts consistent with sound ecological principles.
- 3. Implement a monitoring program to assess the impacts of silvicultural activities on the function of the ecosystem.
- 4. Silvicultural operations will be used to maintain a balanced distribution of forest structures across the landscape.
- 5. Minimize fragmentation of vegetational communities by silvicultural operations.
- 6. Select silvicultural techniques based upon management objectives rather than strictly upon profitability.
- 7. Avoid logging within buffer zones around areas where wild lupine (*Lupinus perennis*), Karner blue butterfly, or eastern massasauga rattlesnake have been identified or are likely present.
- 8. Natural regeneration will be the preferred method of forest re-establishment.

- 9. Do not log erosion-prone soils unless mitigation measures are in place to prevent adverse impacts.
- 10. Block forest roads when logging in an area has been completed. Seed logging roads with native grasses if damage is deemed significant.
- 11. Investigate the potential for outleasing of forest land.

# 3.3.5 Threatened, Endangered and Other Special Status Species

The overall goal of threatened and endangered species management is to protect, restore, and maintain populations of native special status plant and animal species within the guidelines of ecosystem management. In addition, the Federal Endangered Species Act and Section 29.15 Wisconsin Statutes, provide for the protection and preservation of federal- and state-listed species, including plant and animal communities designated as endangered resources.

The following is a list of Management Guidelines related to threatened, endangered, and other special status species:

- In coordination with, or as part of a cooperative agreement, with the Wisconsin
  Department of Natural Resources and the United States Fish and Wildlife Service, survey
  for the presence and abundance of listed or proposed threatened or endangered species.
  Survey procedures and methodologies should follow those of the cooperating agency.
  Disseminate survey results to the cooperating agency.
- 2. Identify the site-specific critical habitat requirements of threatened and endangered species.
- 3. Protect, restore, and maintain threatened and endangered species habitats.

- 4. Identify management objectives for resident threatened and endangered species. Develop and implement strategies to achieve population viability for resident threatened and endangered species.
- 5. Monitor threatened and endangered species populations to ensure management objectives are being met.
- 6. Assess potential impacts to threatened and endangered species from proposed management actions, public and military activities, and identify appropriate mitigation measures.

#### 3.3.6 Outdoor Recreation

The overall all goal of outdoor recreation management is to develop outdoor recreational opportunities in response to identified needs and demand for these opportunities within the scope of the military mission and as safety and security permit.

The following is a list of Management Guidelines related to outdoor recreation:

- Work with the task force to create outdoor recreation regulations for the expanded Hardwood Range. Establish a plan to monitor outdoor recreation at the site to identify adverse impacts and compliance with the regulations. Review and revise regulations as necessary with input from local, state, and federal agencies and recreational users of the site. Provide outdoor recreation regulations to the public.
- 2. Develop and provide to the public an informational brochure that describes outdoor recreational opportunities at the expanded Hardwood Range.
- Maintain the recreational emphasis on passive activities that require little or no development.

- 4. Develop facilities for outdoor recreation only in the event that a specific need is identified and justified.
- 5. The intensity of management of outdoor recreation will be proportional to the amount of public use and always consistent with military requirements.
- 6. Restrict motor vehicle use to designated roads.
- 7. If possible, provide alternative routes for the snowmobile trails that will be impacted by the range expansion.

#### 3.3.7 Cultural Resources

The overall goal of cultural resources management is to protect and preserve cultural resources in accordance with state and federal laws and regulations and to ensure that management activities do not degrade known cultural resources.

The following is a list of Management Guidelines related to cultural resources:

- In coordination with, or as part of a cooperative agreement, with the State Historical Society of Wisconsin (SHSW), survey for the presence of historic and archaeological resources. Survey procedures and methodologies should follow those of the cooperating agency. Disseminate survey results to the cooperating agency.
- 2. Keep all historic and archaeological site locations confidential.
- During planning and implementation of natural resource management activities, consider
  potential impacts of land use management activities on cultural resources. Consult with
  SHSW as needed.

- 4. Identify activity buffer zones around significant cultural resources.
- 5. Monitor significant cultural resources for adverse impacts from management, range, and recreational activities.

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# APPENDIX L BIOLOGICAL SURVEY OF HARDWOOD RANGE



# WISCONSIN AIR NATIONAL GUARD BIOLOGICAL SURVEY FINAL REPORT:

PROPOSED HARDWOOD RANGE EXPANSION, EXISTING HARDWOOD BOMBING AND GUNNERY RANGE, AND VOLK FIELD



# PREPARED FOR:

WISCONSIN AIR NATIONAL GUARD VOLK FIELD COMBAT READINESS TRAINING CENTER CAMP DOUGLAS, WI FEBRUARY 1998

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# **ACRONYMS AND ABBREVIATIONS**

CFL - County Forest Land

CRTC - Combat Readiness Training Center

dbh - diameter at breast height

DNR - Wisconsin Department of Natural Resources

**DO** - delivery order

expansion area - proposed Hardwood Range expansion

FWS - U.S. Fish and Wildlife Service

NHI - Wisconsin Natural Heritage Inventory
ILUMP - Integrated Land Use Management Plan

MTR - military training route
NGB - National Guard Bureau

NRCS - Natural Resource Conservation Service
NWR - Necedah National Wildlife Refuge

SCS - Soil Conservation Service

Stone & Webster - Stone & Webster Environmental Technology and Services

SWA - State Wildlife Area

WIANG - Wisconsin Air National Guard

# 1.0 INTRODUCTION

# 1.1 PURPOSE AND NEED

In 1996, the National Guard Bureau (NGB) required a biological survey of land (Figure 1-1) that it is considering for acquisition (7,100 acres) and land that it presently operates in south-central Wisconsin (10,100 acres total). This report documents the results of the biological survey for the proposed Hardwood Range expansion (expansion area) (Figures 1-1, 1-2 and 2-1) and the Hardwood Range Bombing and Gunnery Range (Hardwood Range) (Figures 1-1, 1-2, 2-2a, and 2-2b), both near Babcock, Wisconsin, and Volk Field near Camp Douglas, Wisconsin (Figures 1-1 and 2-3).

The purpose of the biological survey was to determine the biological resources present on the lands considered for acquisition and existing lands used by the Wisconsin Air National Guard (WIANG), including the types of species present; extent of species present; types, amounts and special areas of habitat; soils; and wetlands.

The remainder of this report is organized as follows:

- Section 2 of this report characterizes the three sites, including site background information.
- Section 3 characterizes the ecological components, including the soil, hydrologic regime, vegetation, and floral and faunal resources. Section 3 also summarizes the results of the quantitative vegetation survey.
- Section 4 presents a list of references used in preparation of this report.
- Section 5 lists the individuals contacted who provided information used in the preparation of this report.

- Appendix A lists the fauna of the expansion area and Hardwood Range.
- Appendix B details the survey methods and materials used to quantify vegetation at the proposed expansion area, Hardwood Range, and Volk Field.
- Appendix C contains the tables summarizing the results of the statistical analysis conducted on the vegetation data during the 1996 field survey period.
- Appendix D contains the actual data collection sheets recording the raw field data for the vegetation survey.
- Appendix E contains the field data sheets for threatened, endangered or rare species identified during the 1996 field survey period.
- Appendix F contains the records of conversations with individuals who provided information or guidance for the biological survey and survey report.

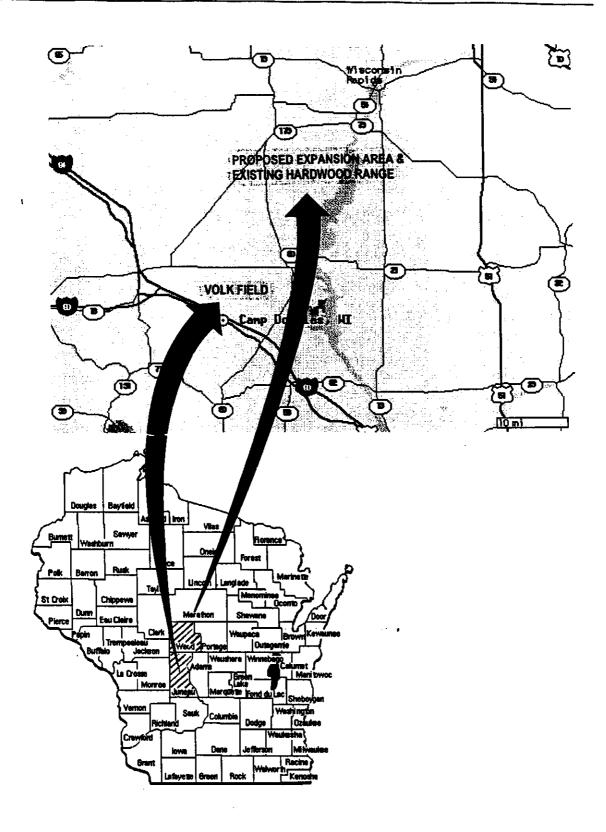


Figure 1-1. General vicinity of the 1996 WIANG biological survey.

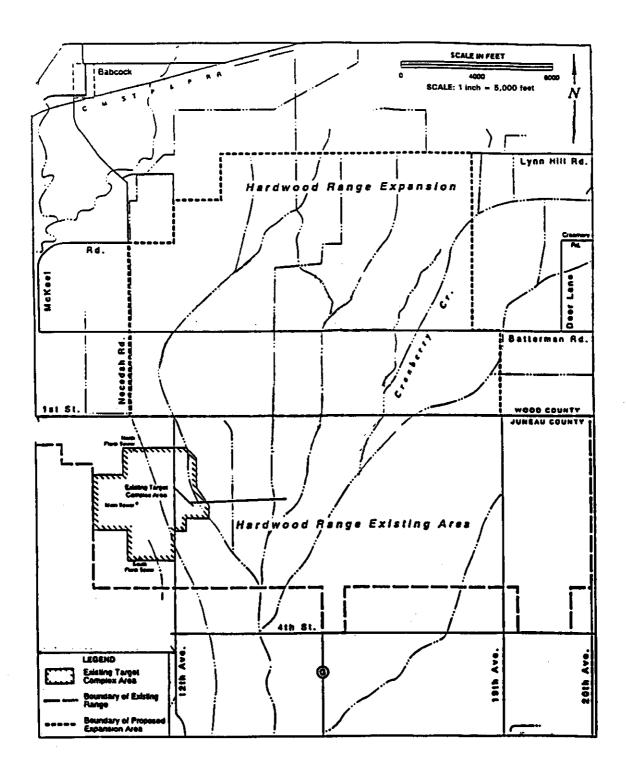


Figure 1-2. WIANG existing Hardwood Range in Juneau County, WI and proposed expansion area in Wood County, WI.

# PHYSIOGRAPHY AND GEOGRAPHY 2.0

### PROPOSED EXPANSION AREA 2.1

# Location

The proposed expansion area is located immediately north of the present Hardwood Range, along the southern boundary of Wood County in Sections 24, 25 and 36, T. 21N., R. 3E., and Sections 19-21, 28-34, T. 21N., R. 4E and contains about 7,100 acres (Figure 2-1). Land ownership of the expansion area is divided between public and private ownership, with Wood County managing about 6,162 acres and 975 acres under private ownership.

# Land Use

Current land use is predominantly county forestry (87 percent) and the remainder (13 percent) is private, including a single cranberry farm in the southwestern corner and scattered residential properties (Figure 2-4).

# **Physiography**

The expansion area is within the Central Sand Plain physiographic province. The landscape has flat or gently undulating topography with elevations ranging from about 960 to 970 feet above sea level (Figure 2-1). Drainage ditches provide most of the drainage for the expansion area. Vegetation communities are distributed fairly homogeneously among uplands and wetlands. Some contiguous upland areas approach 160 acres in size, while most areas are 40 acres in size. Forested wetlands are the dominant wetland type, and generally do not exceed 5 acres in size. Both uplands and forested wetlands are dominated by a mixed canopy of deciduous tree species including oak, pine, maple, and aspen. A number of private and county areas have been planted with red pine and are managed for timber production.

# **Proposed Expansion**

The capabilities of new aircraft and weapons systems require larger areas that will allow pilots to perform necessary training maneuvers. Given these concerns, the WIANG and NGB believe the existing size of the Hardwood Range limits realistic training. The NGB and WIANG also propose to modify the restricted air space above the range and create additional military training routes to the range. A target complex with an impact area would be developed in the center of the combined proposed expansion area and existing Hardwood Range (Figure 1-2). Inert training ordnance of various sizes would be dropped on the impact area. A drop zone and assault/landing strip are also proposed, with the remaining area being utilized as a safety buffer.

# 2.2 HARDWOOD RANGE BOMBING AND GUNNERY RANGE

#### Location

Hardwood Range is located in south-central Wisconsin on the northern boundary of Juneau County, Sections 1-2, 11-12, T. 20 N., R. 3 E. and Sections 3-10, T. 20 N., R. 4 E (Figures 2-2a and 2-2b), and contains about 7,900 acres. Since 1954, Juneau County has granted an easement to the State of Wisconsin, Department of Military Affairs for the lands contained within the Hardwood Range. The easement was recently renewed for another term and is due to expire in the year 2025. The communities of Finley and New Miner are located immediately to the west and south of the existing range, while the city of Wisconsin Rapids is located approximately 21 miles northeast.

### Land Use

Current land use is primarily a manned bombing and gunnery range for day and night training. Military activities are concentrated in the open grassland areas in the western half of the range. The present range (about 8,000 acres) is within Juneau County's Cranberry Rock Forestry Unit and includes 3,368 acres of County Forest Land (CFL) and 4,560 acres of other State of Wisconsin lands. The eastern half of the range and portions of the western half are

managed by the Juneau County Lands, Forestry, and Parks Department for timber production, and for wildlife and wildlife habitat management. Juneau County holds the timber rights on the entire bombing range, including the area owned by the State. As a safety precaution, timber harvesting and county forestry activities are prohibited during range flights.

Consequently, commercial timber operations that extend more than about one-half mile into the restricted area have been difficult to accomplish (Juneau County Forest Comprehensive Land Use Plan, 1995). Public access is regulated by special entry restrictions and the closure of entry roads except during the 2-week deer hunting season each autumn. The Wisconsin Department of Natural Resources (DNR) manages the deer hunting season in concert with the WIANG, and the range is included as part of the larger Deer Hunt Management Unit (DHMU) 53.

# Physiography

Hardwood Range is within the Central Sand Plain physiographic province, which is part of the broad glacial lake basin formed at the end of the last ice-age about 10,000 years ago. The landscape has flat or gently undulating topography with elevations ranging from about 945 to 965 feet above sea level (Figures 2-2a and 2-2b). The old lake basin has extensive wetlands resulting from the flat topography, high water table, and slowly permeable layers of silt and clay within the lake deposits. In the eastern half of Hardwood Range, upland vegetation areas of varying sizes (2 to greater than 160 acres) dominate, and are interspersed among variably-sized wetlands (less than 2 to greater than 40 acres). Both uplands and forested wetlands are dominated by a mixed canopy of deciduous tree species including oak, pine, maple and aspen. A number of areas planted with red pine are scattered throughout the range.

#### 2.3 VOLK FIELD AIR NATIONAL GUARD BASE

#### Location

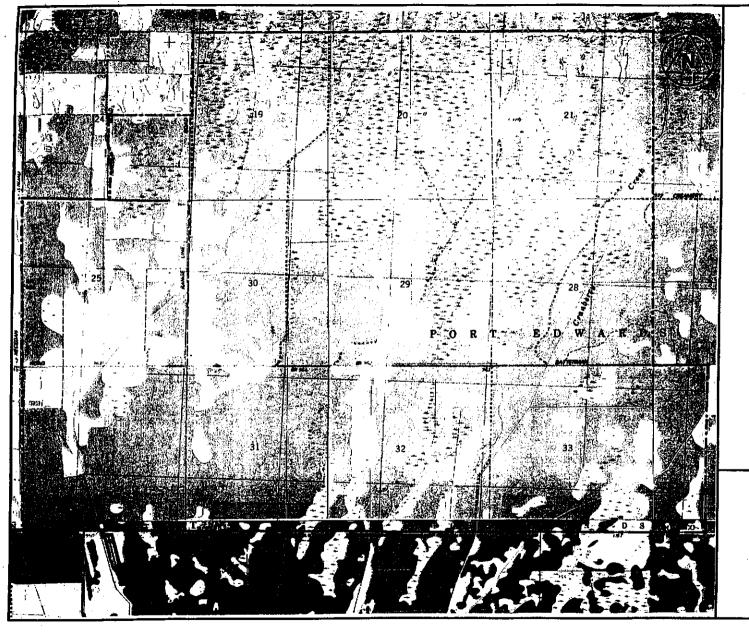
Volk Field is a Combat Readiness Training Center (CRTC) located in south-central Wisconsin on the west-central boundary of Juneau County near the village of Camp Douglas, Sections 14-16, 20-22, T. 7 N., R. 2 E (Figure 2-3) and contains 2,258 acres leased from the State of Wisconsin. Volk Field is located about 20 miles southwest of the Hardwood Range. The town of Mauston, the county seat, is located about 11 miles southeast.

#### **Land Use**

Current land use is primarily for military support operations serving specifically as a flight training and enhanced air combat readiness center. Volk Field serves as the operations center for midwestern National Guard units participating in bombing training on Hardwood Range. On-base military activities are concentrated around the air field in the center of Volk Field, although military training activities occur throughout the base area.

# Physiography

Volk Field is within the Central Sand Plain physiographic province. The landscape has flat or gently undulating topography except for Target Bluff, a sand bluff located in the southeastern corner of Volk Field (Figure 2-3). Elevations range from about 900 to 1,100 feet above sea level. More than two-thirds of the base has been disturbed and the principal activity area is occupied by the airfield and numerous associated buildings. Drainage ditches provide most of the drainage for the base except for two sewage disposal ponds. Vegetation outside the principal activity area typically consists of communities associated with dry sandy prairie, sand barrens, and wetland areas north of the runway. Oak woodlands and mixed deciduous woodlands are found in the southeastern corner of the base, and wetlands are found in the area of Target Bluff.





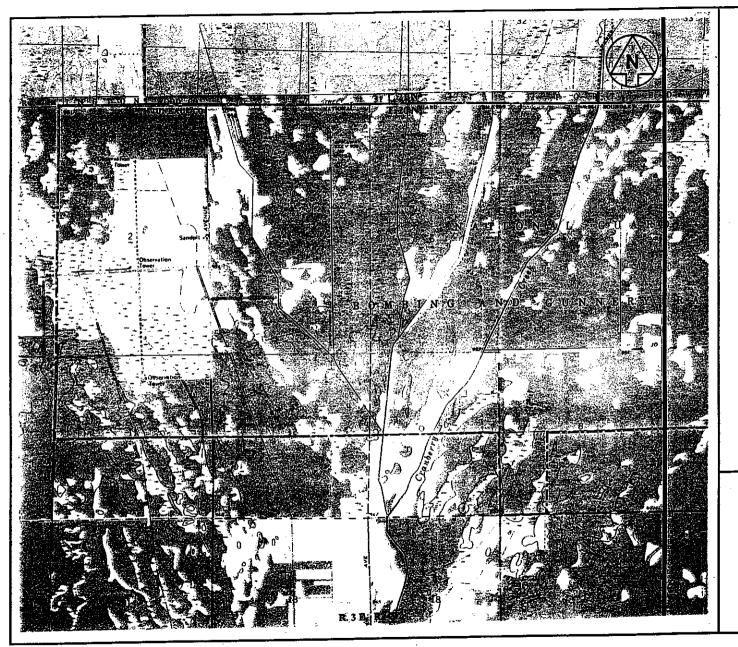


Scale: 1 inch = 2,000 feet

# General Area Map Proposed Expansion Area

Source: U.S. Geological Survey
Babcock, WI Quadrangle (1984)
New Miner, WI Quadrangle (1969)

Figure 2-1







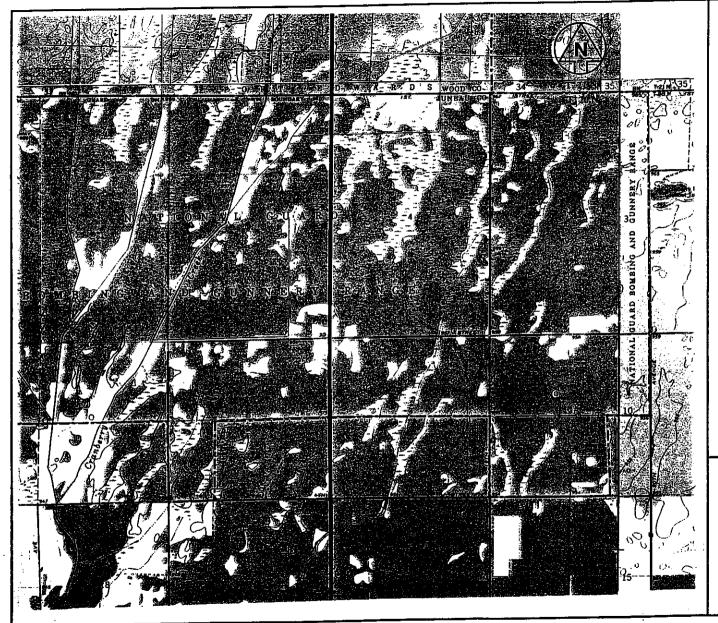
Scale: I inch = 2,000 feet

General Area Map (Map 1 of 2)

# **Existing Hardwood Range**

Source: U.S. Geological Survey Babcock, WI Quadrangle (1984) New Miner, WI Quadrangle (1969) Arkdale NW, WI Quadrangle (1985)

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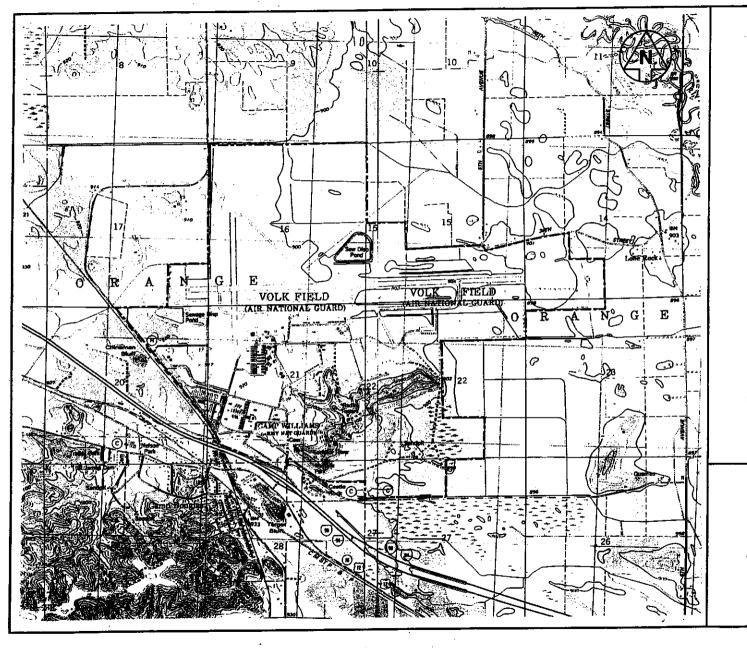
Scale: I inch = 2,000 feet

General Area Map (Map 2 of 2)

**Existing Hardwood Range** 

Source: U.S. Geological Survey
Babcock, WI Quadrangie (1984)
New Miner, WI Quadrangie (1969)

**July 2** 21







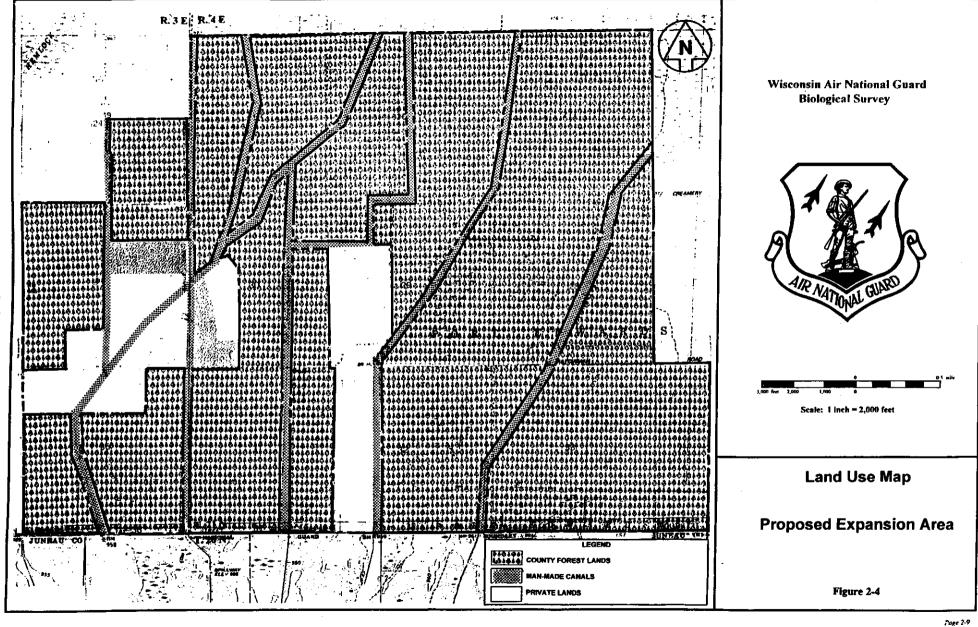
Scale: 1 inch = 2,000 feet

# **General Area Map**

# **Volk Field**

Source: U.S. Geological Survey Camp Douglas, WI Quadrangle (1983) New Lisbon, WI Quadrangle (1983)

Figure 2-3



# Topographic Map Symbols

| rimary highway, hard surface                               |                                      |              | _                        |
|--|--------------------------------------|--------------|--------------------------|
| Secondary highway, hard surface                            |                                      |              |                          |
| ight duty road, principal street, hard or improved surface | <u>·</u>                             |              |                          |
| Other road or street; trail                                |                                      |              |                          |
| Route marker: Interstate; U.S.; State                      | $\bigcirc$                           |              | $\bigcirc$               |
| Raliroad: standard gage; narrow gage                       | $\stackrel{\smile}{\longrightarrow}$ | ~ <u> </u>   | $\stackrel{\sim}{\cdot}$ |
| Bridge; overpass; underpass                                | <del>**</del>                        | i            | -                        |
| Tunnel: road; railroad                                     | <del></del>                          |              |                          |
| Built up area; locality; elevation                         |                                      | 3 .          | 155                      |
| Airport; lending field; lending strip                      | <del></del>                          | <del>/</del> |                          |
| National boundary  |                                      |              |                          |
| State boundary   |                                      |              |                          |
| County boundary  |                                      |              |                          |
| National or State reservation boundary                     |                                      |              | ٠                        |
| Land grant boundary  | <u> </u>                             | · · · · · ·  |                          |
| U.S. public lands survey: range, township; section         |                                      |              |                          |
| Range, township; section line: protracted                  |                                      |              |                          |
| Power transmission line; pipeline                          |                                      |              |                          |
| Dam; dem with lock   | <u></u>                              | J —          | -0-                      |
| Cemetery; building   | [ <del>]]</del> ]                    | •            | _                        |
| Windmill; water well; spring                               | ¥                                    | er.          | ٥.                       |
| Mine shaft; adit or cave; mine, quarry; gravel pit         | <b>B</b> ≻                           | *            | >                        |
| Campground; pionic area; U.S. location monument            | 1                                    | π            | 4                        |
| Ruins; cliff dwelling                                      |                                      |              |                          |
| Distorted surface: strip mine, leve; send                  |                                      | 949          | 411.9                    |
| Contours: index; intermediate; supplementary               | ,,                                   |              |                          |
| Bathymetric contours: index; intermediate                  |                                      |              |                          |
| Stream, lake: perenniel; intermittent                      | $\sim$                               | > ~          | $\subset$                |
| Rapids, large and small; fells, large and small            | *, *                                 |              | $\rightarrow$            |
| Area to be submerged; marsh, swemp                         |                                      | _ = ,        | <u></u>                  |
| Land subject to controlled inundation; woodland            |                                      | <u>.</u>     |                          |
| Scrub; mangrove  |                                      | *            | 9.7                      |
| Orchard; vineyard  |                                      |              |                          |

# 3.0 ECOLOGICAL CHARACTERIZATION

The focus of this section is to provide a general ecological characterization of the proposed Hardwood Range expansion area, existing Hardwood Range, and Volk Field. A general overview of each of the three sites is discussed in Section 2.0, Physiography and Geography. Discussion of the ecological components examined in the biological survey begins with soil resources (Section 3.2) followed by hydrologic resources (Section 3.3), vegetation habitats and forest management (Section 3.4), and flora and fauna (Section 3.5). Section 3.4 includes discussion of the results of data collected during the vegetation survey conducted in July and August 1996. Standard common names for plants and animals are used; however, the scientific names are included and italicized since there is often wide variability, and even local variability, in common names.

#### 3.1 GENERAL ECOLOGICAL CHARACTERIZATION

The proposed expansion area, Hardwood Range, and Volk Field are located generally within the vegetational tension zone (Curtis, 1959; WIANG, 1994). Curtis (1959) defines this vegetational area as a transitional ecotone lying between the prairie forest province in the southwest portion of Wisconsin and the northern hardwoods province in the northeast.

Jackson (1961) recognizes a similar mid-state transition zone, with the Canadian Life Zone to the north and Upper Austral Life Zone to the south. The uniqueness of the tension zone comes from the blending of plant species and, in some cases animal species, with southern species approaching their northern range limits and northern species approaching their extreme southern range limits.

Following the Pleistocene glaciation, species from the Great Plains entered Wisconsin during a dry, warm period. Many of these species remain as relict populations, disjunct from their main population. The western glass lizard (*Ophisaurus attenuattus*, Wisconsin endangered) is, for example, found chiefly west of the Mississippi River, and has crossed east

into adjacent northern states (Conant, 1958). This species may occur on the proposed expansion area, Hardwood Range and Volk Field.

The proposed expansion area and Hardwood Range are drained by the Yellow River, while Volk Field is drained by the Lemonweir River. Both rivers flow into the Wisconsin River within Juneau County and become part of the Mississippi River watershed. These river drainages have contributed to the actual and potential biodiversity of the three sites. The network of ditches, creeks, and rivers provide important habitat and serve as important migration and dispersal corridors (WIANG, 1994).

According to the U.S. Fish and Wildlife Service (FWS) (1995), DNR (1995), and the Integrated Land Use Management Plan (ILUMP) (WIANG, 1994), the extensive acreage of natural areas occurring within 15 miles of the proposed expansion area, Hardwood Range, and Volk Field provide potential population sources of plant and animal species for the expansion area, range, and base. Necedah National Wildlife Refuge (NWR) and Wood County State Wildlife Area (SWA) are 5 miles west of the proposed expansion area and Hardwood Range. Sandhill SWA is less than 5 miles northwest of the proposed expansion area. Meadow Valley SWA lies just west of the Necedah NWR within 10 miles of both the proposed expansion area and Hardwood Range and is within 7 miles north of the base. Mill Bluff State Park is within 2 miles northwest of Volk Field, and Fort McCoy is approximately 15 miles west of the base. These areas support large concentrations of migratory waterfowl, sandhill cranes, and a wide variety of nesting waterbird species. A number of federal and state threatened and endangered species and species of special concern have been observed at all of these refuges including Karner blue butterfly (Lycaerides melissa samuelis Nabokov) (Necedah NWR, Fort McCoy, Meadow Valley and Wood County SWAs; federal and Wisconsin endangered), Eastern massasauga rattlesnake (Sistrurus catenatus cantenatus) (Necedah NWR; federal species of concern and Wisconsin endangered), bald eagle (Haliaeetus leucocephalus) (Meadow Valley SWA; federal endangered and Wisconsin threatened), and timber wolf (Canis lupus) (Necedah NWR, Meadow Valley and Wood County SWAs; federal and Wisconsin endangered).

#### 3.2 SOIL RESOURCES

#### 3.2.1 Soil Series

The following soil series are recognized by the Natural Resource Conservation Service (NRCS and formerly Soil Conservation Service [SCS]) and have been mapped on the proposed expansion area (Figures 3-1a and 3-1b), Hardwood Range (Figures 3-2a, 3-2b, and 3-2c), and Volk Field (Figures 3-3a and 3-3b). Table 3-1 provides a soil series classification for the proposed expansion area; Tables 3-2 and 3-3 provide classification of the Hardwood Range and Volk Field, respectively. Soil characteristics, such as drainage and erodibility, have ramifications for land use planning that should be taken into consideration. Soils also exert a fundamental influence on the distribution of vegetative communities and their associated flora and fauna (see Sections 3.3 and 3.4). For example, poorly drained soils would be more likely to be associated with wetland plant communities than would soils which are well-drained.

Table 3-1. Proposed expansion area soil series classification.

| Soil Series      | es Subgroup              |          |
|------------------|--------------------------|----------|
| Friendship (FrA) | Typic Udipsamments       | Entisols |
| Meehan (Mh)      | Aquic Udipsamments       | Entisols |
| Newson (Ne)      | Humaqueptic Psammaquents | Entisols |

Source: SCS, Soil Classification of Wood County, Wisconsin, 1977

Table 3-2. Hardwood Range soil series classification.

| Soil Series      | Soil Series Subgroup     |          |
|------------------|--------------------------|----------|
| Friendship (FrB) | Typic Udipsamments       | Entisols |
| Meehan (MnA)     | Aquic Udipsamments       | Entisols |
| Newson (Ns)      | Humaqueptic Psammaquents | Entisols |

Source: SCS, Soil Classification of Wood County, Wisconsin, 1977

FrA, FrB-Friendship sand, 1 to 6 percent slopes. This unit consists of deep, nearly level to gently sloping, moderately well-drained soil found on flats, stream terraces, outwash plains and basins of glacial lakes. The surface layer consists of 2 inches of black sand. Below this, at 2 to 29 inches, is a layer of brown to yellowish-brown, mottled, loose sand. The

substratum, to a depth of 60 inches, consists of a medium to dark yellowish-brown, mottled, loose sand.

MnA, Mh-Meehan-Newson complex, 0 to 3 percent slopes. This soil complex consists of nearly level to gently sloping, deep, and somewhat to very poorly drained soils. The Meehan unit is a deep, nearly level to gently sloping, somewhat poorly drained soiled found on low flats, in drainageways and depressions, on concave foot slopes of outwash plains, on stream terraces, and in glacial lakes. The soil consists of a surface layer of very dark gray sand that grades into medium to light yellowish brown, mottled sand. The Newson soil consists of a 3-inch top layer of black, mucky, very friable, loamy sand. Between 3 and 17 inches is a dark to medium-grayish brown, very friable sand. From 17 to 60 inches the subsoil consists of a yellowish-brown, mottled, loose sand. The soil is subject to frequent ponding and flooding.

Ne, Ns-Newson-Dawson complex, 0 to 2 percent slopes. This soil complex consists of deep, nearly level soils that are formed on drainages and depressions of glacial outwash plains, on stream terraces and in the basins of glacial lakes. The Newson soil has been described above. The Dawson soil has an upper layer that consists of 37 inches of black and very dark brown muck. Below this, to 60 inches, this soil consists of a dark grayish-brown loose sand.

Table 3-3. Volk Field soil series classification.

| Soil Series           | Soil Series Subgroup     |           |
|-----------------------|--------------------------|-----------|
| Boone (BpF)           | Typic Quartzipsamments   | Entisols  |
| Dawson (De)           | Terric Borosaprists      | Histosols |
| Delton (DrB)          | Arenic Haplualfs         | Alfisols  |
| Friendship (FrB)      | Typic Udipsamments       | Entisols  |
| Loxely (Lx)           | Typic Borosaprists       | Histols   |
| Manawa (MeA)          | Aquollic Hapludalfs      | Alfisols  |
| Meehan (MnA)          | Aquic Udipsamments       | Entisols  |
| Newson (Ne)           | Humaqueptic Psammaquents | Entisols  |
| Palms (PdC)           | Terri Medisaprists       | Histosols |
| Plainbo (PfB)         | Typic Udipsamments       | Entisols  |
| Plainfield (PfC, PfD) | Typic Udipsamments       | Entisols  |
| Poygan (Po)           | Typic Haplaquolls        | Mollisols |
| Udorthents (Ud)       | Typic Udorthents         | Entisols  |
| Wautoma (Wa)          | Mollic Haplaquents       | Entisols  |
| Wyeville (WeA)        | Arenic Hapludalfs        | Alfisols  |

Source: SCS, Soil Classification of Juneau County, Wisconsin, 1991

BpF-Boone-Plainfield-Rock outcrop complex, 12 to 60 percent slopes. This unit consists of moderately steep to very steep, excessively drained soils intermixed with sandstone outcrops.

These soils are found on the sandstone bluffs of Volk Field. The upper layer consists of 2 inches of dark gray fine sand. From 2 to 33 inches in depth, a brownish-yellow to light yellowish-brown loose fine sand is found. Below this is a white quartz sandstone. These soils are primarily a fine sand with up to 35 percent gravel.

Dc-Dawson muck, 0 to 1 percent slopes. This unit consists of deep, nearly level, very poorly drained soils found in flats, bottoms of glacial lakes, stream terraces, and depressions in outwash plains. Typically the upper 38 inches is muck, with loose, dark gray sand found beneath to a depth of 60 inches. The surface may be mucky peat, or have up to 20 inches of sandy or loamy overwash.

DeB-Delton loamy fine sand, moderately well drained, 1 to 6 percent slopes. This soil unit consists of nearly level to gently sloping, deep, moderately well-drained soils found on flats and stream and lake terraces. The surface layer is 10 inches thick and consists of a dark brown, loamy, fine sand. From 10 to 38 inches in depth, the subsoil consists of a brown, mottled very friable sand in the upper part. This grades to a reddish-brown, mottled, very firm, silty clay and clay in the lower part. Soil from 38 to 60 inches is a reddish-brown, mottled, very firm clay.

Lx-Loxley muck, 0 to 1 percent slopes. This unit consists of a deep, nearly level, very poorly drained soil mainly found on low flats, drainages and depressions of glacial outwash plains, and in the basins of glacial lakes. It consists of an organic layer of black muck covering a very dark brown muck. The depth of this muck is over 60 inches. In some areas the soil has been overwashed by up to 20 inches of loam or sand.

MeA, Me-Meehan sand, 0 to 3 percent slopes. This unit consists of deep, nearly level to gently sloping, somewhat poorly drained soil found on low flats, in drainages and depressions, on concave foot slopes of outwash plains, on stream terraces, and in glacial lakes. The soil consists of a surface layer of very dark gray sand that grades into a medium to light yellowish brown, mottled sand.

PdC-Plainbo sand, 6 to 12 percent slopes. This unit consists of moderately deep, sloping, excessively drained soil found on slopes of outwash plains, stream terraces, and nearby uplands. The upper 2 inches consist of a very dark grayish-brown sand. Below this, from 2 to 15 inches, is a strong brown, very friable sand grading to yellowish-brown. From 15 to 30 inches, the soil is a yellowish-brown loose sand. At a depth of 30 inches and below, the soil is Cambrian Sandstone.

PfB-Plainfield sand, 1 to 6 percent slopes. This unit consists of deep, nearly level to gently sloping, excessively drained soils found on flats, side slopes on outwash plains, stream terraces, uplands, and basins of glacial lakes. The upper 8 inches consist of a very dark grayish-brown sand. From 8 to 22 inches the subsoil is a dark yellowish-brown very friable sand. From 22 to 60 inches the soil is a yellowish-brown to light yellowish-brown, loose sand. In some areas this sand is composed of up to 90 percent quartz while in other areas it may contain up to 35 percent gravel and cobbles.

PfC-Plainfield sand, 6 to 12 percent slopes. This unit is a deep, sloping, excessively drained soil found on side slopes of outwash plains, stream terraces, uplands, and the basins of glacial lakes. The upper 2 inches consist of a very dark grayish-brown sand. From 2 to 19 inches is a brown to yellowish-brown, very friable to loose sand. Below this to 60 inches is a light yellowish-brown to very pale brown, loose sand. In some areas this sand is up to 90 percent quartz while in other areas it has up to 35 percent gravel and cobbles.

PfD-Plainfield sand, 12 to 20 percent slopes. This unit consists of a deep, moderately steep, excessively drained soil found on side slopes in the uplands. The upper 4 inches consist of a dark grayish-brown sand. From 4 to 21 inches the soil consists of dark yellowish-brown to dark brown, very friable sand. The rest of the soil column, to a depth of 60 inches, consists of yellowish-brown, loose sand. This sand can consist of up to 90 percent quartz or up to 35 percent gravel and cobbles.

Po-Poygan silt loam, 0 to 2 percent slopes. This unit is a deep, poorly drained soil found on low flats and in drainages and depressions on stream and lake terraces. It is subject to frequent flooding and ponding. The surface layer is black silt loam about 8 inches thick, and the subsoil is dark grayish brown and reddish brown, mottled, firm silty clay about 15 inches

thick. The rest of the substratum is reddish brown, mottled, and very firm silty clay to a depth of 60 inches. The unit also has a high shrink-swell potential.

Ud-Udorthents, nearly level. This unit consists of areas where soil, and in some cases, sandstone have been removed. It is commonly found in areas of Friendship, Meehan, Newson, Plainbo, Plainfield, and Wyeville soils and in areas of the Friendship soils that have a loamy substratum. The color, texture, and thickness of the material vary widely, and many areas are sandy, but some are loamy and clayey. The depth of sandstone ranges from a few inches to more than 60 inches.

Wa-Wautoma loamy sand, 0 to 2 percent slopes. This unit consists of deep, nearly level, poorly drained and very poorly drained soils that are subject to ponding. It is found on low flats, and in drainages and depressions of stream and lake terraces. The upper 8 inches consist of a black, loamy sand. From 8 to 38 inches the soil grades from a gray mottled loose sand, to a gray, mottled friable loam, and finally to a light gray mottled firm silty clay. From 38 to 60 inches the subsoil consists of yellowish-red, mottled, firm silty clay.

WeA-Wyeville sand, 0 to 3 percent slopes. This unit is a deep, nearly level to gently sloping, somewhat poorly drained soil found on foot slopes on stream and lake terraces. The upper 8 inches consist of a very dark gray sand. From 8 to 48 inches the soil is brown, grayish-brown and light brown, mottled, very friable sand with the upper part a reddish-brown and light reddish-brown mottled, firm silty clay.

# 3.2.2 Soil Management Plan

# Proposed Expansion Area

Soil management within the expansion area will largely depend on the location of impact areas. The Newson-Meehan associations are deep, nearly level, somewhat poorly to very poorly drained, sandy and mucky soils characteristic of the glacial Lake Wisconsin basin. Permeability is rapid, and the available water capacity is low. Most areas of this association support native woodland or wetland vegetation, and removal of this vegetation could require protection from flooding and wind erosion. If these soils are drained, crop yields are

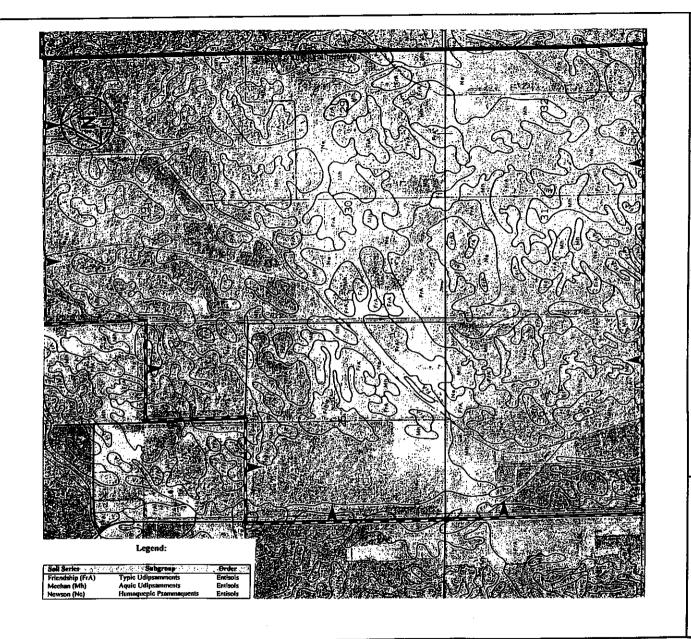
generally limited by the low available water capacity. The sandy soil and high water table make forestry management difficult, and many areas have been planted with pine (SCS, 1977 and 1991).

Friendship soils are also deep, nearly level, and moderately well-drained. Permeability is also rapid, and the available water capacity is low. These soils would be unsuitable for septic tank absorption fields, and only moderately suited to dwellings because of the high water table.

The open drainage ditches are highly erodible, and a number were observed slumping. Such slumping can cause blockage of water flow and reduce drainage capacity. To further reduce slumping, erosion and sedimentation, ditches with steep banks should be cut to their natural angle of repose and revegetated with native vegetation (WIANG, 1994).

# Hardwood Range and Volk Field

A general soil management plan is presented in the 1994 ILUMP for Hardwood Range and Volk Field. The ILUMP considers the erosion potential to be low since soils are well to excessively well-drained, and rainwater and snow filters down through the soil to the water table. Wind erosion is buffered by the sandstone bluffs and vegetative cover of trees, shrubs, and grasses which reduce this erosion potential. By utilizing an erosion control strategy that maintains natural ground cover, revegetates disturbed areas with native species, restricts vehicular traffic to properly maintained roads, erosion in these areas should remain low.







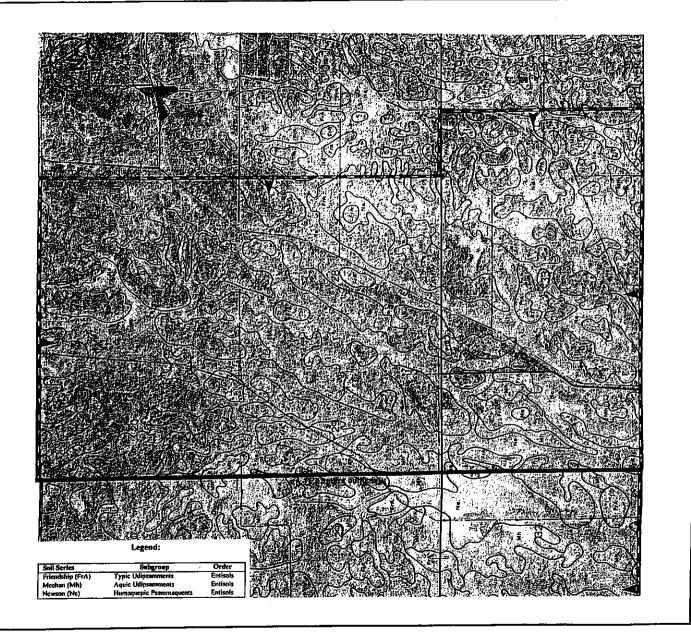
Scale: I inch = 1,650 feet

Soil Survey Map (Map 1 of 2)

# **Proposed Expansion Area**

Source: Natural Resource Conservation Service Wood County, WI Soil Survey (1977) Map Nos. 60 and 61

Figure 3-1a







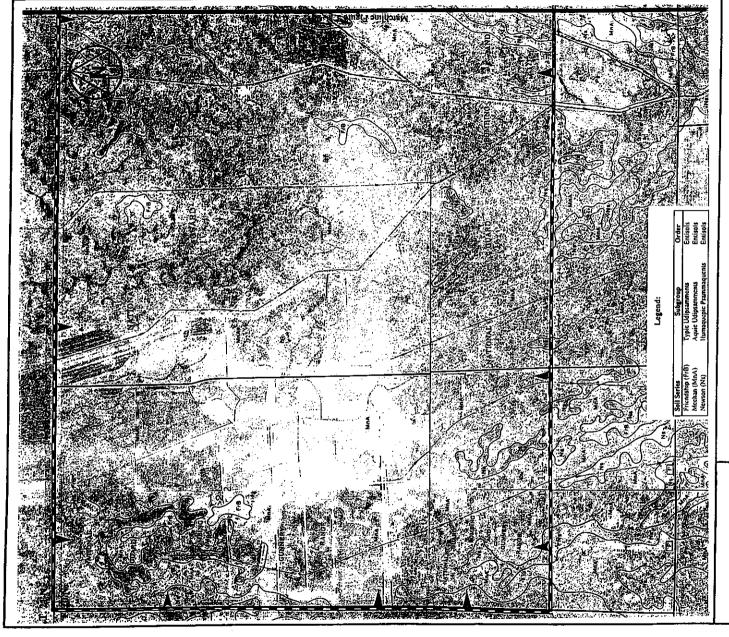
Scale: 1 inch = 1,650 feet

Soil Survey Map (Map 2 of 2)

# **Proposed Expansion Area**

Source: Natural Resource Conservation Service Wood County, WI Soil Survey (1977) Map Nos. 60 and 61

Figure 3-1b





2,000 Feet 1,500 1,000 500 0

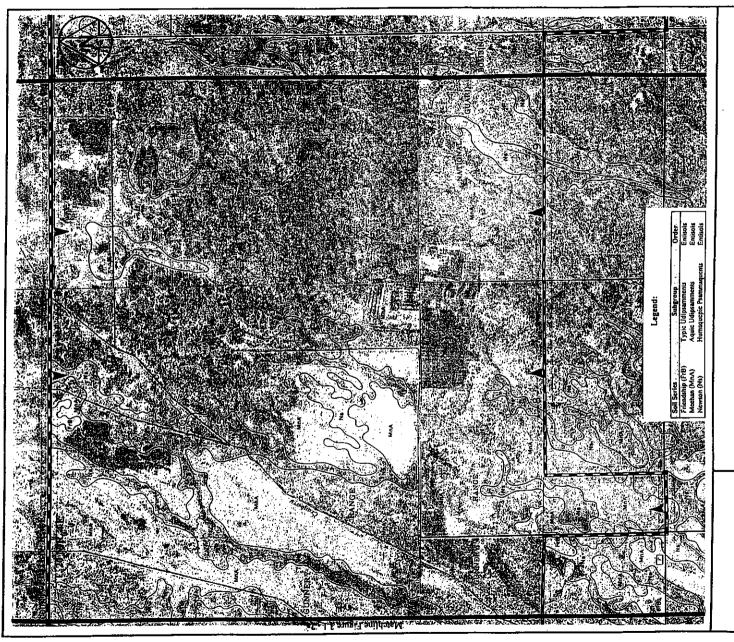
Scale: 1 inch = f,320 feet

Soil Survey Map (Map 1 of 3)

**Existing Hardwood Range** 

Source: Natural Resource Conservation Service Juneau County, WI Soil Survey (1991) Map Nos. 3, 4, 5, 9, 10 and 11

Figure 3-2a







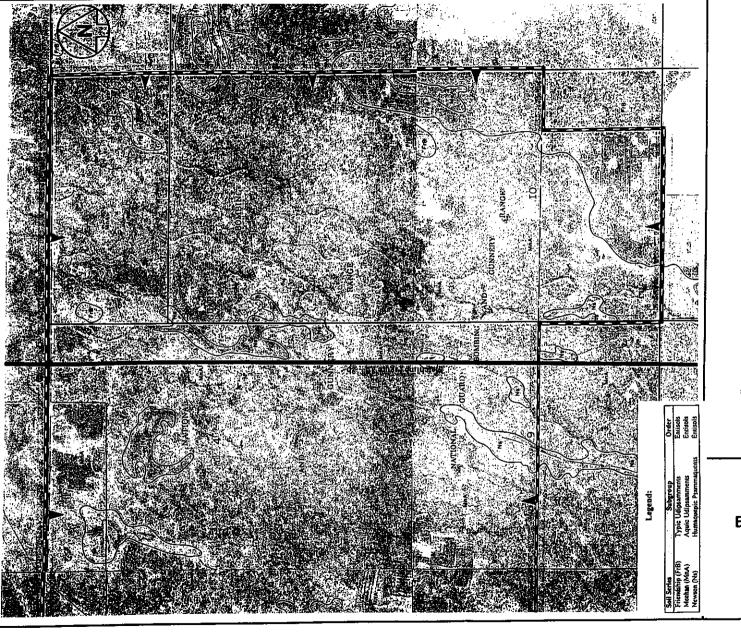
Scale: 1 inch = 1,320 feet

Soil Survey Map (Map 2 of 3)

# **Existing Hardwood Range**

Source: Natural Resource Conservation Service Juneau County, WI Soil Survey (1991) Map Nos. 3, 4, 5, 9, 10 and 11

Figure 3-2b







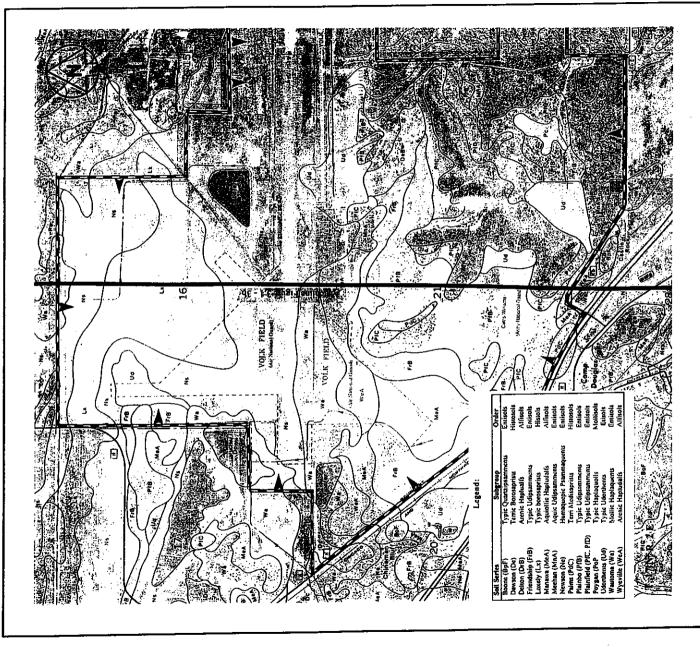
Scale: 1 inch = 1,320 feet

Soil Survey Map (Map 3 of 3)

# **Existing Hardwood Range**

Source: Natural Resource Conservation Service Juneau County, WI Soil Survey (1991) Map Nos. 3, 4, 5, 9, 10 and 11

Figure 3-2c







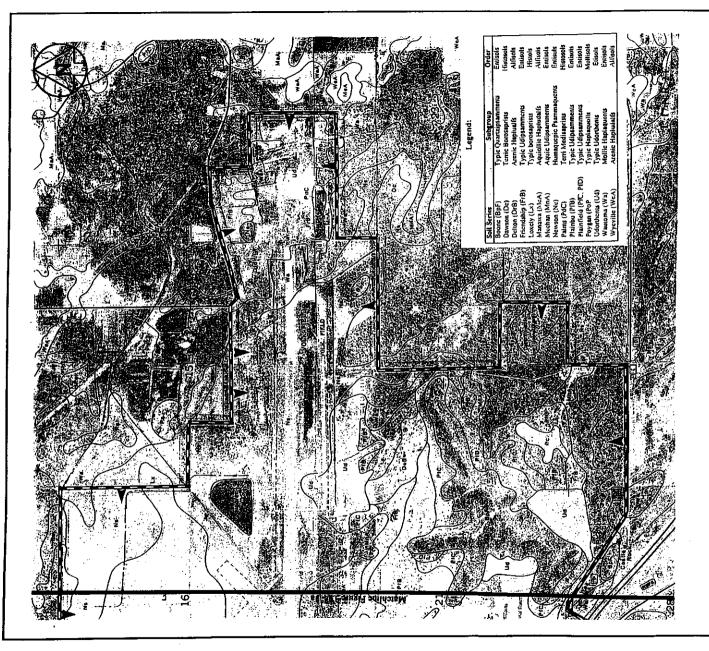
Scale: 1 inch = 1,320 feet

Soil Survey Map (Map 1 of 2)

# Volk Field

Source: Natural Resource Conservation Service Juneau County, WI Soil Survey (1991) Map Nos. 52, 53, 57 and 58

Figure 3-3a







Scale: 1 inch = 1,320 feet

# Soil Survey Map (Map 2 of 2)

# Volk Field

Source: Natural Resource Conservation Service Juneau County, WI Soil Survey (1991) Map Nos. 52, 53, 57 and 58

Figure 3-3b

#### 3.3 HYDROLOGIC RESOURCES

#### 3.3.1 Wetlands

Wetlands are a dominant and extremely varied feature of the proposed expansion area (Figure 3-4), Hardwood Range (Figures 3-5a and 3-5b), and Volk Field (Figure 3-6). This vegetation community contains a mixture of species that are associated with the northern and southern floristic elements of the State (Curtis, 1959). The principal wetland types have been mapped by the FWS (1995) and Wisconsin Wetlands Inventory (DNR, 1992) and include early successional (< 60-80 years) lowland forest, shrub-carr, and fresh (wet) meadow. Small ponds, both artificial and natural, and drainage ditches are found in each of the areas examined. A detailed description of the wetlands on Volk Field is presented in the ILUMP (WIANG, 1994), and, therefore, is not described in this report.

### Proposed Expansion Area

Wetlands are a dominant feature in the expansion area (Figure 3-4), representing more than one-third of the 7,100-acre area. The patches of lowland hardwood forest and shrub-carr probably best resemble original native wetland vegetation (WIANG, 1994), and are intermingled throughout the expansion area. Early successional lowland hardwoods represent the majority of wetland acreage on the expansion area (DNR, 1992).

The most extensive patches (about 25 acres) of early-successional lowland forest occur along Cranberry Creek, and its associated tributary on the eastern side of the expansion area. A few sizable areas (about 25 acres) occur on the extreme western boundary along Necedah Road. These areas grade from seasonally wet to permanently saturated soils. Disturbances to the area are predominantly from timber harvesting. Though dominated by wetland species, some associated upland species occur as well (Table 3-4). Tree species observed include sugar maple (Acer saccharum), silver maple (Acer saccharinum), red maple (Acer rubrum), red oak (Quercus rubra), white pine (Pinus strobus), American elm (Ulmus americana), yellow birch (Betula alleghaniensis), speckled alder (Alnus rugosa), and ash (Fraxinus sp.). Species

observed in the understory and ground layer include winterberry (*Ilex verticilliata*), gray dogwood (*Cornus foemina*), dewberry (*Rubus sp.*), partridgeberry (*Mitchella repens*), and bracken fern (*Pteridium aquillinum*). Quaking aspen (*Populus tremuloides*) was also found in numerous patches of lowland hardwood forest throughout the area.

Shrub-carr plant communities are wetland habitats composed of tall, deciduous shrubs growing on saturated to seasonally flooded soils (Eggers and Reed, 1987). Patches of shrub-carr (< 5 acres) are scattered throughout the expansion area with some of the more intact examples located along County Line Road on the southern edge of the expansion area. Other patches of notable significance (from 5 to 10 acres) occur on the western boundary east of Necedah Road, and in an area spreading southeast of Cranberry Creek. Speckled alder (Alnus rugosa), dogwoods (Cornus stolonifera and Cornus foemina), willows (Salix sp.), and common elderberry (Sambucus canadensis) are common taller components, with wet meadow sedges, grasses, and forbs such as dwarf raspberry (Rubus pubescens) composing the ground cover (Eggers and Reed, 1987). These wetland patches, often having standing water until mid-July, provide valuable feed habitat for migratory songbirds, and breeding habitat for amphibians.

The numerous drainage ditches (Figure 2-4) combine characteristics of shallow open water communities and shallow marsh communities (Eggers and Reed, 1987), providing habitat for both submergent and emergent plant species. These artificial wetlands take on many of the functions and values of natural wetlands.

Table 3-4. Representative wetland and associated upland plant species identified on the proposed expansion area.

| Common Name         | Scientific Name       | Indicator Category <sup>1</sup> |  |
|---------------------|-----------------------|---------------------------------|--|
| Tree Species        |                       |                                 |  |
| Red maple           | Acer rubrum           | FACW/OBL                        |  |
| Sugar maple         | Acer saccharum        | FACW                            |  |
| Silver maple        | Acer saccharinum      | FACW                            |  |
| Speckled alder      | Alnus rugosa          | OBL                             |  |
| Yellow birch        | Betula alleghaniensis | FAC                             |  |
| Gray dogwood        | Cornus foemina        | FACW-                           |  |
| Red-osier dogwood   | Cornus stolonifera    | FACW                            |  |
| Ash species         | Fraxinus sp.          | OBL, FAC, or FACW               |  |
| White pine          | Pinus strobus         | FACU                            |  |
| Quaking aspen       | Populus tremuloides   | FAC                             |  |
| Red oak             | Quercus rubra         | FACU                            |  |
| American elm        | Ulmus americana       | FACW                            |  |
| Shrub, forb and fer | n species             |                                 |  |
| Winterberry         | Ilex verticilliata    | FACW                            |  |
| Partridgeberry      | Mitchella repens      | FACU                            |  |
| Bracken fern        | Pteridium aquillinum  | FACU                            |  |
| Dwarf raspberry     | Rubus pubescens       | FACW                            |  |
| Dewberry            | Rubus sp.             | FACW or FACU                    |  |
| Willow              | Salix sp.             | FACW                            |  |
| Common elderberry   | Sambucus canadensis   | FACW                            |  |

# <sup>1</sup> Indicator Categories:

| OBL (Obligate Wetland) -     | species occurs almost always (estimated probability > 99%) under natural conditions in wetlands.   |
|------------------------------|--|
| FACW (Facultative Wetland) - | species usually occurs in wetlands (estimated probability 67-99%), but occasionally found in non-wetlands.   |
| FAC (Facultative) -          | species is equally likely to occur in wetlands or non-wetlands (estimated probability 34-66%).   |
| FACU (Facultative Upland) -  | species usually occurs in nonwetlands (estimated probability 67-99%), but occasionally found in wetlands (estimated probability (1-33%).                                 |
| UPL (Obligate Upland) -      | species almost always occurs in non-wetlands (estimated probability > 99%) under natural conditions in the region specified, but may occur in wetlands in other regions. |

### Hardwood Range

The open area in the western one-fifth of Hardwood Range (Figure 3-5a) consists almost entirely of disturbed fresh (wet) meadow and low prairie. This area is drained by one major creek and numerous ditches that were constructed on the farm homesteads of the 1910's and 1920's. Big bluestem and other prairie associated species (see Appendix C) are present throughout the area. Disturbances include ordnance impacts and associated construction and clean-up activities, and annual burning of the open area. The cleared target area was graded 10 years ago. These disturbances maintain the area in an early successional state.

The remaining four-fifths of the lands east of the open meadow area of the Hardwood Range (Figures 3-5a and 3-5b) is a mosaic of early-successional lowland forests (primarily lowland hardwoods) with pockets of forested uplands and open wetlands consisting of emergent vegetation (sedges, cattails) (FWS, 1995 and DNR, 1992). The area grades from seasonally wet to permanently saturated soils. This is a diverse area in terms of vegetation, dominated by wetland species, but it also includes upland species. Tree and understory species are similar to those observed at the proposed expansion area (Table 3-4) and Volk Field. The major drainage is Cranberry Creek and a series of interconnected creeks and irrigation canals. The principal disturbance in the area has resulted from timber harvesting, which is managed by Juneau County Land, Forestry, and Parks Department. Other disturbances have occurred due to ordnance impacts, construction of targets, and routine maintenance.

#### 3.3.2 Other Surface Waters

# Proposed Expansion Area

More than 18 miles of drainage ditches and creeks drain the expansion area, generally flowing south to the Yellow River (Figure 2-1), which joins the Wisconsin River approximately 27 miles south. Cranberry Creek is the major waterway, carrying much of the surface runoff from the expansion area. In addition to supplying irrigation water for cranberry farms and other downstream farm irrigation uses, these waterways provide important wildlife habitat for a variety of wildlife during all or most of the year. Some ditches

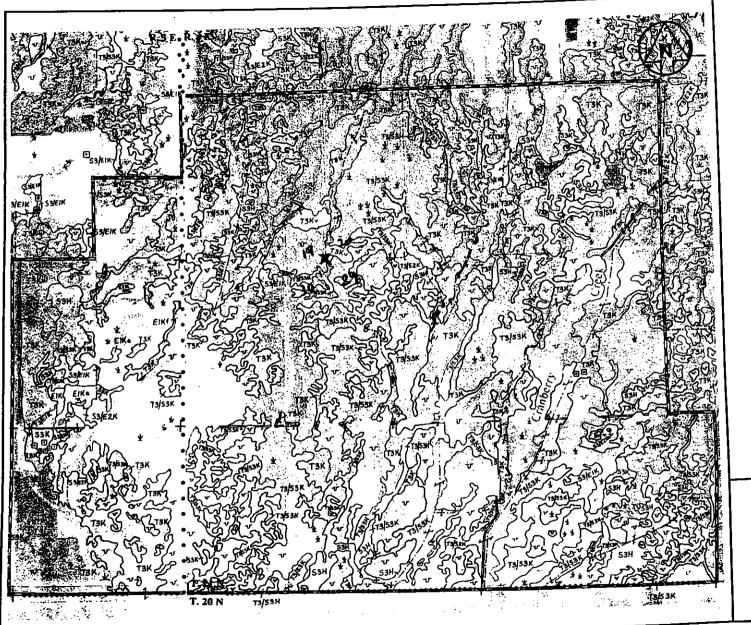
exhibited considerable erosion due to scouring and overly steep banks. Recent dredging operations to remove sediments and vegetative growth was evident in some areas where road access made the mobilization and maneuvering of dredging equipment possible.

### Hardwood Range and Volk Field

About 11 miles of drainage ditches and creeks drain Hardwood Range (Figures 2-2a and 2-2b), flowing south to the Yellow River; about 3 miles of drainage ditches drain Volk Field, flowing to the Lemonweir River. Cranberry Creek receives water draining from the expansion area, and the drainages within Volk Field (Figure 2-3) are integral to the management of storm water runoff on the base (WIANG, 1994). Ditches at both Hardwood Range and Volk Field appear to require frequent cleaning and dredging, and the ease of equipment access appears to allow more active management.

# Wetlands Habitat Map Legend:

| Code     | Class                |                             | Subclass                        | Hydrologic<br>Modifier | Special<br>Modifier      |
|----------|----------------------|-----------------------------|---------------------------------|------------------------|--------------------------|
|          | upland               |                             |                                 |                        |                          |
|          |                      | wetland smaller             | 1                               |                        |                          |
| <u> </u> |                      | that 3 acres                | l-persistent                    | K-wet soil             |                          |
| 1K       |                      | E-emergent                  | 1-persistent                    | K-wet soil             | a- abandoned             |
| 1Ka      |                      | E-emergent                  | i-persistent                    | K-wet soil             | f- farmed                |
| EIKſ     |                      | E-emergent                  | 2- narrow-leafed,               | H-standing water       |                          |
| E2H      |                      | E-emergent                  | persistent                      |                        | a- abandoned             |
| E2Ha     |                      | E-emergent                  | 2- narrow-leafed,<br>persistent | H-standing water       | a- abandoned             |
| _        | \                    |                             | 2- narrow-leafed,               | K-wet soil             |                          |
| E2K      | 1                    | E-emergent                  | persistent                      |                        | d-partially ditched      |
|          |                      | EM-emergent                 | 1-persistent                    | A-temporarily flooded  | d-partially ditched      |
| PEMIAd   | P-palustrine         |                             | 1-persistent                    | C-seasonally flooded   |                          |
| PEMIC    | P-palustrine         | EM-emergent                 | l-persistent                    | C-seasonally flooded   | x-excavated              |
| PEMICx   |                      | EM-emergent<br>FO-forested- | 1-broad-leafed                  | A-temporarily flooded  | ı                        |
| PFOIA    | P-palustrine         | LO-totesten-                | deciduous                       |                        | d-partially ditched      |
|          | <u> </u>             | FO-forested-                | l-broad-leafed                  | A-temporarily flooded  | d-partially ditened      |
| PFOIAd   | P-palustrine         | LO-integren-                | deciduous                       |                        | d-partially ditched      |
| PFO1Cd   | P-palustrine         | FO-forested-                | l-broad-leafed<br>deciduous     | C-seasonally flooded   | o-partially differen     |
|          |                      | SS-scrub-shrub              | 1-broad-leafed                  | F-semi-permanently     |                          |
| PSSIF    | P-palustrine         | 33-36100-311100             | deciduous                       | flooded                | x-excavated              |
|          | D - slustring        | UB-                         |                                 | G-intermittently       | X-excavated              |
| PUBGx    | P-palustrine         | unconsolidated              |                                 | exposed                |                          |
| 1        | }                    | bottom                      | ļ ·                             |                        | <del></del>              |
| PUBKx    | P-palustrine         | UB-                         |                                 | l .                    | <u> </u> •               |
| PUBAX    | 1 -parasame          | unconsolidated              |                                 |                        | Į.                       |
|          | 1                    | bottom                      |                                 | 11 Secretaria          | x-excavated              |
| R2UBH    | x R2-lower perennial | UB-                         | T-                              | H-permanently flooded  | 7-6,001,000              |
| i Kaobii | riverine             | unconsolidated              |                                 | 1                      | 1                        |
| 1        | 1                    | bottom                      |                                 | C-seasonally flooded   | x-excavated              |
| R4SBC    | x R4-intermittent    | SB-streambed                |                                 | C-seasonally flooded   | A-CACATAICS              |
| S3       |                      | S-scrub-shrub               | 3- broad-leafed                 | <b>\</b>               | 1                        |
|          |                      |                             | deciduous                       | H-standing water       | <del></del>              |
| S3H      |                      | S-scrub-shrub               | 3- broad-leafed                 | U-2ttrioning water     |                          |
| l        |                      | ·                           | deciduous                       | V                      | <del></del>              |
| S3K      |                      | S-scrub-shrub               | 3- broad-leafed deciduous       | K-wet soil             |                          |
| S3Kv     |                      | S-scrub-shrub               | 3- broad-leafed deciduous       | K-wet soil             | v- vegetation<br>removed |
| T3       |                      | T-forested-                 | 3- broad-leafed deciduous       |                        |                          |
| T3K      |                      | T-forested-                 | 3- broad-leafed deciduous       | K-wet soil             |                          |
| T3Kv     |                      | T-forested-                 | 3- broad-leafed deciduous       | K-wet soil             | v- vegetation<br>removed |
| T3Kw     |                      | T-forested-                 | 3-broad-leafed deciduous        | K-wet soil             | w-floodplain             |
| WØH      |                      | w-open water                | Ø-bottom characte<br>unknown    | r H-standing water     |                          |







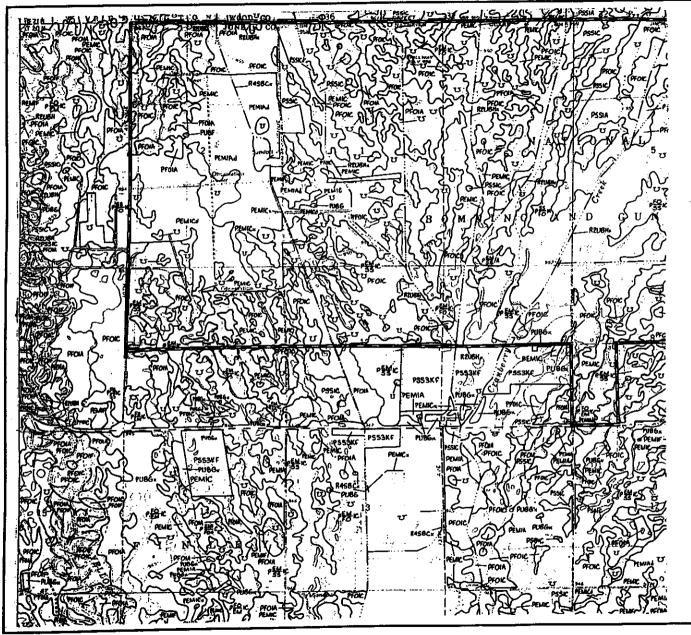
Scale: 1 inch = 2,000 feet

# Wetlands Inventory Map

# **Proposed Expansion Area**

Source: Wisconsin Department of Natural Resources Bureau of Water Regulation and Zoning

Figure 3-4







Scale: 1 inch = 2,000 feet

Wetlands Inventory Map (Map 1 of 2)

**Existing Hardwood Range** 

Source: Wisconsin Department of Natural Resources
Bureau of Water Regulation and Zoning

Figure 3-5a

and the second section of the second second

Wisconsin Air National Guard Biological Survey





Scale: 1 inch = 2,000 feet

Wetlands Inventory Map (Map 2 of 2)

# **Existing Hardwood Range**

Source: Wisconsin Department of Natural Resources Bureau of Water Regulation and Zoning

Figure 3-5b



Scale: 1 inch = 2,000 feet

# **Wetlands Inventory Map**

### Volk Field

Source: Wisconsin Department of Natural Resources Bureau of Water Regulation and Zoning

Figure 3-6

#### 3.4 VEGETATION HABITATS AND FOREST MANAGEMENT

# 3.4.1 Principal Vegetation Habitat Types

The six general habitat types categorized for the biological survey include four upland types and two wetland types. The six general habitat types are: mixed deciduous woodland, pine woodland, dry oak woodland, disturbed (including logged, fire, or grassland areas), palustrine shrub-carr wetlands, and palustrine emergent wetlands (Table 3-5). Categorization of the habitat types was based on Curtis (1959), the ILUMP (WIANG, 1994), Eggers and Reed (1987), field reconnaissance, and aerial photointerpretation. Because the proposed expansion area, Hardwood Range, and Volk Field are between the vegetational transition zone lying between the prairie forest province and the northern hardwoods province (Curtis, 1959), the principal habitat (vegetational) types are a blending of plant species from both provinces.

The biological survey focused primarily on vegetation sampling in each of the four upland types (Table 3-6). Early-successional lowland forested wetlands (Section 3.3.1) were included in sampling for mixed deciduous woodlands because they are heavily interspersed with deciduous upland vegetation and are not, due to cover density, readily distinguishable on the ground without conducting extensive wetland delineations. No vegetation sampling occurred in emergent and shrub-carr wetlands because of a similar need to accurately delineate wetland boundaries in order to design an appropriate sampling scheme. A general discussion of the wetlands at the proposed expansion area and Hardwood Range is contained in Section 3.3.1. A discussion of the wetlands at Volk Field is contained in the ILUMP (WIANG, 1994).

Dry oak woodlands were not sampled randomly at the proposed expansion area because they typically occurred in small, isolated pockets within the mixed deciduous woodland type. Dry oak woodland sites sampled at the expansion area were located deliberately and incidentally by the field survey team during sampling of other habitat types. Sampling for dry

oak woodlands at Hardwood Range did not occur due to field time limitations and the difficulty of locating suitable sampling sites.

The remainder of this section describes each of the general habitat types. Following that discussion, the results of the field surveys conducted at the proposed expansion area, Hardwood Range, and Volk Field are presented. A discussion of the survey methodology is included in Appendix B.

#### Mixed Deciduous Woodland

Mixed deciduous woodlands are the most prevalent habitat type at the proposed expansion area, Hardwood Range, and Volk Field (Table 3-5). This vegetation type is variable and includes characteristics of both early-successional southern hardwood forests and northern hardwoods. Communities tend to be dry to dry-mesic with a crown closure (> 5 meters high) typically exceeding 50 percent (Curtis, 1959). Communities are typically dominated by various oak species (Quercus sp.) including black (Q. velutina), white (Q. alba), pin (Q. ellipsoidalis), and red (Q. rubra) (Appendix C, Tables C.1-1, C.1-5, and C.1-7). Pines (*Pinus* sp.) are also one of the major dominants including red (*P. resinosa*), jack (*P.* banksiana), and white pine (P. strobus). Red maple (Acer rubrum), quaking aspen (Populus tremuloides), and big tooth aspen (P. grandidentata) also tend to occur on the more moist sites. Herbaceous species noted during July and August include bracken fern (Pteridium aquilinum), sedge (Carex sp.), false Solomon's seal (Smalicina racemosa), twisted stalk (Streptopus roseus), and blueberry (Vaccinium sp.) (Appendix C, Tables C.2-1, C.2-5, C.2-8). These communities are widely distributed throughout the entire expansion area and along the northern and eastern half of the Hardwood Range. At Volk Field, the mixed deciduous woodlands are located northeast, south, and east of Target Bluff.

#### Pine Woodland

Pine woodlands occur as a remnant community type in the expansion area (Figure 3-7) and eastern half of the Hardwood Range (Figures 3-8a and 3-8b). The pines may occur in nearly pure stands of a single species or in mixtures of jack (*P. banksiana*), red (*P. resinosa*), and white pine (*P. strobus*), and are generally the result of reforestation efforts that occurred during the 1940's and 1950's (Pingray, personal communication; Westegaarde, personal communication). Poor quality oak pole-timber and saw-timber may also be found in mature pine stands. The growth form of the pines is typically a predominating central trunk, great height, small taper, and small branches. In mature pine stands, hardwoods such as red maple (*A. rubrum*) and quaking aspen (*P. tremuloides*) are found (Appendix C, Tables C.1-3 and C.1-6). Aspen is usually a pioneer invader following forest fires, and is extremely intolerant of shade (Curtis, 1959). The herbaceous layer can be fairly variable (Appendix C, Tables C.2-3 and C.2-6).. In some of stands the herbaceous layer is practically non-existent, and is replaced by a litter layer of needles. Other herbaceous species noted during July and August include sedge (*Carex* sp.), bracken fern (*P. aquilinum*), and blueberry (*Vaccinium* sp.).

# Dry Oak Woodland

In general, the dry oak woodland habitat is dominated by oaks including white (Quercus alba), black (Q. velutina), red (Q. rubra), and pin oak (Q. ellipsoidalis), but white, red, and jack pine (Pinus strobus, P. resinosa, and P. banksiana) may be associated in some stands (Appendix C, Tables C.1-2 and C.1-8). Canopy closure exceeds 50 percent. The herbaceous cover is typically bracken fern (P. aquilinum), sweet fern (Comptonia peregrina), big bluestem (Andropogon gerardi), little bluestem (Andropogon scoparius), sedge (Carex sp.), and blueberry (Vaccinium sp.) (Appendix C, Tables C.2-2 and C.2-9). Oak stands are most prevalent at Volk Field, where they occur on the top and north faces of Target Bluff. Prior to conducting any field surveys, an attempt was made to delineate each vegetation habitat using aerial photos. However, at the expansion area and Hardwood Range, stands were difficult to clearly delineate using aerial photographs and during initial field reconnaissance

because they were found to occur in small, isolated pockets within the mixed deciduous woodland type.

Consequently, because of the difficulty of locating dry oak woodlands on Hardwood Range, no sampling in that type occurred. Oak stands were sampled on the expansion area where they could be located on the ground, but were not selected randomly. The decision to locate sample sites on the expansion area was based on the project's emphasis on the expansion area and field time limitations. Sampling of dry oak woodlands on the Hardwood Range was eliminated because the time period necessary to locate sites on the ground would have reduced sampling of other vegetation habitats at all sites.

# Disturbed Including Logged, Burned, and Grassland Sites

Disturbed areas were those sites that had shown visible signs of being logged within at least the last 5 to 10 years. Such stands were found in the southern half of the expansion area. The areas are generally characterized by large openings in excess of 80 acres. Due to the age of the disturbed/logged site, a tree canopy was lacking. This habitat type is located solely on the expansion area. Ground cover in these disturbed sites is generally a mix of seedling aspen (*Populus* sp.), black cherry (*Prunus serotina*), bracken fern (*P. aquilinum*), dwarf raspberry (*Rubus pubescens*), dewberry (*Rubus* sp.), sedge (*Carex* sp.) and blueberry (*Vaccinium* sp.) (Appendix C, Tables C.2-4, C.2-7, C.2-10).

Disturbed grassland areas are primarily wet meadows. This habitat was found north of the runways and on the northeast corner of Volk Field, and the open area of Hardwood Range. Most of the areas have been heavily disturbed by past draining and farming activities. Past and present day burning (both controlled and accidental) on Hardwood Range has also maintained disturbed grassland habitat. On Volk Field, large portions of this habitat type are dominated by monotypic stands of reed canary grass (*Phalaris arundinacea*), stinging nettle

(*Urtica dioica*), wood rose (*Rosa woodii*), and elderberry (*Sambucus canadensis*). Ground cover on Hardwood Range not only includes those species found on Volk Field, but also bracken fern (*P. aquilinum*), goldenrod (*Solidago* sp.), sedge (*Carex* sp.), dewberry (*Rubus* sp.), and various grasses.

### 3.4.2 Survey Results

# Proposed Expansion Area (Figure 3-7)

Mixed Deciduous Woodland (5,095 acres, 71.4 percent)

Oak species (Quercus sp.) and quaking aspen (Populus tremuloides) dominate the canopy cover in the mixed deciduous woodland habitat type. Average percent canopy cover for the mixture of oak species (red, black, and pin oak) and aspen is about 29 percent (Appendix C, Table C.1-1). Cover also includes 18 percent red maple (Acer rubrum).

Litter (41 percent) dominates the understory (Appendix C, Table C.2-1). Sedge (Carex sp.) (14 percent) occurs secondarily in the understory, followed by a mixture other species, including dewberry (Rubus sp.) (5 percent), seedling red maple (5 percent), bracken fern (Pteridium aquilinum) (4 percent), and bare ground (3 percent).

### Pine Woodland (939 acres, 13.1 percent)

Red pine (*Pinus resinosa*) dominates the canopy cover in this habitat type (61 percent). Aspen (*Populus tremuloides*) (8 percent) also occurs secondarily in the canopy (Appendix C, Table C.1-3).

Mayflower (Maianthemum canadense) dominates the herbaceous cover in pine woodlands (56 percent) (Appendix C, Table C.2-3). Other species that occur to a much lesser extent include seedling red pine (7 percent), groundsel (Senecio sp.) (4 percent), seedling red maple (4 percent), dwarf raspberry (Rubus pubescens) (3 percent), and oxalis (Oxalis sp.) (3 percent).

Table 3-5. Approximate coverage (acres) of principal vegetation habitat types based on aerial photo-interpretation and wetland inventory maps (FWS, 1995 and DNR, 1992).

| Area/Vegetation Type                       | Acres | % Total Area |  |
|--|-------|--------------|--|
| Proposed Expansion                         |       |              |  |
| Mixed Deciduous Woodland <sup>1</sup>      | 5,095 | 71.4         |  |
| Pine Woodland                              | 939   | 13.1         |  |
| Disturbed Areas                            | 421   | 5.9          |  |
| Palustrine Shrub-carr Wetland <sup>2</sup> | 628   | 8.8          |  |
| Palustrine Emergent Wetland <sup>2</sup>   | 37    | 0.5          |  |
| Cranberry Bog                              | 18    | 0.1          |  |
| Total                                      | 7,138 | 100          |  |
| Hardwood Range                             |       |              |  |
| Mixed Deciduous Woodland <sup>1</sup>      | 6,327 | 79.8         |  |
| Pine Woodland                              | 349   | 4.4          |  |
| Disturbed Areas                            | 539   | 6.8          |  |
| Palustrine Shrub-carr Wetland <sup>2</sup> | 293   | 3.7          |  |
| Palustrine Emergent Wetland <sup>2</sup>   | 420   | 5.3          |  |
| Total                                      | 7,928 | 100          |  |
| Volk Field                                 |       |              |  |
| Mixed Deciduous Woodland <sup>3</sup>      | 325   | 14.4         |  |
| Dry Oak Woodland                           | 218   | 9.6          |  |
| Disturbed Areas4                           | 1,508 | 66.8         |  |
| Palustrine Shrub-carr Wetland <sup>2</sup> | 29    | 1.3          |  |
| Palustrine Emergent Wetland <sup>2</sup>   | 178   | 7.9          |  |
| Total                                      | 2,258 | 100          |  |

<sup>&</sup>lt;sup>1</sup>Includes palustrine forested wetlands and dry oak woodlands.

# Dry Oak Woodland (Unknown total acreage)

Oak species (*Quercus* sp.) dominate the canopy cover of this habitat type (59 percent), while white pine (*Pinus strobus*) (7 percent) and quaking aspen (*Populus tremuloides*) (7 percent), occur secondarily in the canopy (Appendix C, Table C.1-2).

<sup>&</sup>lt;sup>2</sup>Source: FWS (1995) and DNR (1992) Wetlands Inventory Maps.

<sup>&</sup>lt;sup>3</sup>Includes palustrine forested wetlands.

<sup>&</sup>lt;sup>4</sup>Includes areas used for base operations (e.g., runways, base building facilities)

Sedges (Carex sp.) (18 percent), blueberry (Vaccinium sp.) (16 percent), litter (16 percent), and bracken fern (Pteridium aquilinum) (13 percent) dominate the herbaceous understory (Appendix C, Table C.2-2) in this habitat type. Stinging nettle (Urtica dioica), dewberry, and several grasses also occurred in substantially lower percentages (< 2 percent).

Table 3-6. Vegetation sampling effort (number of samples) for average percent canopy and herbaceous cover.

|                                       | Sampling Effort |          |            |          |  |  |
|---------------------------------------|-----------------|----------|------------|----------|--|--|
| Area/Vegetation Type                  | Canopy          | % Effort | Herbaceous | % Effort |  |  |
| Proposed Expansion                    | 35              | 58%      | 160        | 73%      |  |  |
| Dry Oak Woodland                      | 5               | 14%      | 40         | 25%      |  |  |
| Disturbed/Grassland                   | 0               | 0%       | 40         | 25%      |  |  |
| Pine Woodland                         | 10              | 29%      | 40         | 25%      |  |  |
| Mixed Deciduous Woodland <sup>1</sup> | 20              | 57%      | 40         | 25%      |  |  |
| Hardwood Range                        | 15              | 25%      | 40         | 18%      |  |  |
| Disturbed/Grassland                   | 0               | 0%       | 10         | 25%      |  |  |
| Pine Woodland                         | 5               | 33%      | 10         | 25%      |  |  |
| Mixed Deciduous Woodland <sup>1</sup> | 10              | 67%      | 20         | 50%      |  |  |
| Volk Field                            | 10              | 17%      | 20         | 9%       |  |  |
| Disturbed/Grassland                   | 0               | 0%       | 10         | 50%      |  |  |
| Dry Oak Woodland                      | 5               | 50%      | 5          | 25%      |  |  |
| Mixed Deciduous Woodland <sup>1</sup> | 5               | 50%      | 5          | 25%      |  |  |

<sup>&</sup>lt;sup>1</sup>Includes palustrine forested wetlands.

# Disturbed Areas (421 acres, 5.9 percent)

Because of management activities, limited and, therefore, insignificant canopy cover is present (Appendix C, Table C.1-4).

The understory (Appendix C, Table C.2-4) is dominated by bracken fern (*Pteridium aquilinum*) (19 percent), litter (12 percent), sedge (*Carex* sp.) (12 percent), dewberry (Rubus sp.) (9 percent), aspen (*Populus tremuloides*) (6 percent), blueberry (*Vaccinium* sp.) (5 percent), and black cherry (*Prunus serotina*) (3 percent).

# Hardwood Range (Figures 3-8a and 3-8b)

Mixed Deciduous Woodland (6,327 acres, 79.8 percent)

Canopy cover in this habitat type (Appendix C, Table C.1-5) is dominated by oak species (Quercus sp.) (40 percent), but contained a mix of trembling aspen (Populus tremuloides) (15 percent), red pine (Pinus resinosa) (11 percent), and maple species (Acer sp.) (7 percent). Black cherry (Prunus serotina) (3 percent), big toothed aspen (Populus grandidentata) (2 percent), and white pine (Pinus strobus) (1 percent) are the only other species occurring in this vegetation type.

On the Hardwood Range, the understory (Appendix C, Table C.2-5) is dominated by litter (38 percent), followed by bracken fern (*Pteridium aquilinum*) (14 percent), blueberry (*Vaccinium* sp.) (8 percent), sedge (*Carex* sp.) (7 percent), dwarf raspberry (*Rubus pubescens*) (6 percent), speckled alder (*Alnus rugosa*) (4 percent), seedling maple (*Acer* sp.) (4 percent), an unidentified moss (3 percent), and seedling oak (*Quercus* sp.) (2 percent). Other species that occur include cherry (*Prunus* sp.), seedling aspen (*Populus* sp.), twisted stalk (*Streptopis roseus*), bedstraw (*Gallium* sp.), and strawberry (*Frageria* sp.).

### Pine Woodland (349 acres, 4.4 percent)

Red pine (*Pinus resinosa*) (31 percent) dominates the canopy overstory in this habitat type (Appendix C, Table C.1-6). Red maple (*A. rubrum*) (10 percent), trembling aspen (*Populus tremuloides*) (9 percent), jack pine (*Pinus banksiana*) (6 percent), and black cherry (*Prunus serotina*) (2.5 percent) also occurred.

Sedges (Carex sp.) (44 percent) and litter (43 percent) are the principal components of the understory (Appendix C, Table C.2-6). Other species occur to a much lesser extent (< 2 percent) including dewberry (Rubus sp.), blueberry (Vaccinium sp.), bracken fern (Pteridium aquilinum), strawberry (Frageria sp.), and seedling oak (Quercus sp.).

# Disturbed Areas (539 acres, 6.8 percent)

Because of management activities, no canopy cover is present.

The principal species in the herbaceous layer (Appendix C, Table C.2-7) include bracken fern (Pteridium aquilinum) (34 percent), sedge (Carex sp.) (21 percent), elderberry (Sambucus canadensis) (18 percent), dewberry (Rubus sp.) (18 percent), bare ground (16 percent), and big bluestem (Andropogon geraldi) (16 percent). Other species occurring include unknown grasses (10 percent), British soldiers (NAME) (10 percent), strawberry (Frageria sp.) (7 percent), Maximillian's sunflower (Helianthus maximiliani) (6 percent), bedstraw (Galium sp.) (6 percent), and goldenrod (Solidago sp.) (5 percent). Blueberry, litter, aster (Aster sp.), unknown vetches, unknown composites, little bluestem (Andropogon scoparius), and seedling maples each consist of less than 4 percent average cover.

# Volk Field (Figure 3-9)

# Mixed Deciduous Woodland (325 acres, 14.4 percent)

The dominant species within this habitat type is red maple (Acer rubrum) (54 percent), followed by ash (Fraxinus sp.) (14 percent), and oak species (Quercus sp.) (11 percent) (Appendix C, Table C.1-7). Other species include speckled alder (Alnus rugosa) (6 percent), trembling aspen (Populus tremuloides) (5 percent), white birch (Betula papyrifera) (3 percent), and white oak (Quercus alba) (2 percent).

The herbaceous understory is dominated by sedges (Carex sp.) (29 percent) and big bluestem (Andropogon geraldi) (20 percent) (Appendix C, Table C.2-8). Litter (9 percent), unidentifiable grasses (5 percent), bare ground (3 percent), mayflower (Maianthemum canadense) (3 percent), and thistle (Cirsium sp.) (3 percent) also occur.

# Dry Oak Woodland (218 acres, 9.6 percent)

Oak species (Quercus sp.) dominate the canopy of this habitat type (57 percent) followed by jack pine (Pinus banksiana) (10 percent), white pine (P. strobus) (10 percent), red pine (P. resinosa) (6 percent), white oak (Quercus alba) (6 percent), and red maple (Acer rubrum) (2 percent) (Appendix C, Table C1-8). Black cherry (Prunus serotina) and big tooth aspen (Quercus grandidentata) each made up slightly more than 1 percent of the herbaceous cover.

The herbaceous understory is dominated by mayflower (*Maianthemum canadense*) (47 percent) (Appendix C, Table C.2-9). A mix of other species, including sedge (17 percent), an unidentifiable scroph (*Scrophulariaceae* sp.) (14 percent), and blueberry (*Vaccinium* sp.) (13 percent) also occurs. An unidentifiable grass, bracken fern (*Pteridium aquilinum*), and oak seedlings (*Quercus* sp.) each consist of less than 3 percent of the herbaceous cover.

# Disturbed Areas (1,508 acres, 66.8 acres)

Because of management activities, no canopy cover is present.

The herbaceous layer in this habitat type is dominated by reed canary grass (*Phalaris arundinacea*) (47 percent), followed by Ambrosia (*Ambrosia* sp.) (28 percent), wood rose (*Rosa woodii*) (20 percent), and litter (10 percent) (Appendix C, Table C.2-10). Other species occurring include goldenrod (Solidago sp.) (5 percent), little bluestem (*Andropogon scoparius*) (3 percent), and elderberry (*Sambucus canadensis*) (3 percent).

# 3.4.3 Forest Management Objectives

In 1995, both Juneau and Wood County implemented their revised 10-year county forest plans. These plans have established comprehensive operating policies and procedures

for county forest lands including management of the forest for the following criteria: raw materials for the wood-products industries, recreation, forest aesthetics, watershed protection, wildlife habitat, biologic diversity, and endangered and threatened plants and animals. The discussion that follows provides a general overview of the current management situation and county objectives within the proposed expansion area, Hardwood Range, and Volk Field.

# Juneau County

As of 1996, the Hardwood Range (about 8,000 acres) was contained within the Cranberry Rock Unit and included 3,368 acres of CFL and 4,560 acres of State of Wisconsin lands. For management purposes, the unit was further subdivided into 9 forest compartments. The County held the timber rights on the entire bombing range, including the area owned by the State. The State lease, which originated in 1954, currently expires in February 2025. A county easement, which grants WIANG use of the Hardwood Range, runs concurrently with the State lease and also expires in February 2025. There is no CFL contained within Volk Field.

Silvicultural management within the Hardwood Range is the same as other units within Juneau County; however, because the range is used year-round, commercial timber harvesting that extends more than about one-half mile into the restricted area has been difficult to accomplish (Juneau County Forest Comprehensive Land Use Plan, 1995). Special entry restrictions apply to this unit, and entry roads are gated except during the 2-week deer hunting season occurring in the fall. Timber harvesting and county forestry activities are prohibited during range flights as a safety precaution. Merchantable timber found east of the target area in the western and central portions of the range has been greatly reduced due to the ordnance imbedded in standing wood (Juneau County Forest Comprehensive Land Use Plan, 1995).

# **Wood County**

The proposed expansion area (about 7,100 acres) is located entirely within Wood County. As of 1996, the 13 forest compartments found within the expansion area contain about 6,200 acres of CFL (Wood County Forest Comprehensive Land Use Plan, 1995) (Figure 2-4). The entire CFL area within the proposed expansion area is open for public use.

# Management Objectives

A primary goal of the County Forest Plan is to provide sustainable management of forest stands, while also maintaining and enhancing the diversity of native vegetation populations for their biological, recreational, cultural, and economic values. Wildlife management of forest game (white-tailed deer, ruffed grouse, wild turkey) and for some other wildlife and endangered species is centered around maintaining early successional species such as aspen, jack pine, and oak (Wood County Forest Comprehensive Land Use Plan, 1995).

Aspen is recognized for providing the greatest habitat values to a broader array of wildlife species (Juneau County Forest Comprehensive Land Use Plan, 1995). Aspen is considered valuable because it provides food (aspen buds) to ruffed grouse and other game species; it also has value because it provides nesting and hiding cover. Thus, the county considers aspen to be a critical habitat type requiring attentive management due its steady decline over the past 20-30 years, and the conversion of aspen to more shade-tolerant timber types.

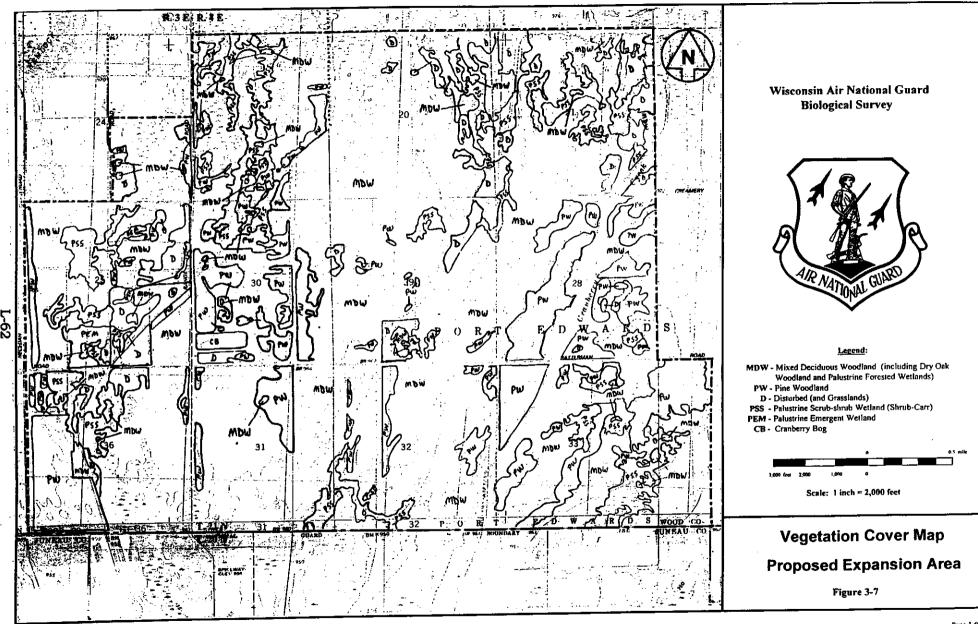
Oak is also beneficial to a wide array of game and non-game wildlife, and occurs naturally in smaller, isolated stands or in mixed stands with aspen and jack pine. Oak is high quality wildlife habitat not only for its value in acorn production, but also because of the diverse shrub and forb community associated with the type (Juneau County Forest

Comprehensive Land Use Plan, 1995). Most of the important wildlife species utilize oak habitat for its food value, as well as for nesting and cover.

Juneau and Wood County have established the following general management goals, which are eligible for grants under the State's County Forest Wildlife Habitat Improvement Program:

- Varying the size of clearcuts, with the average less than 100 acres;
- Old growth is a community with dominant trees at or near biological maturity, and the biological age of an old-growth community varies with species and site. Shade-tolerant and shorter lived timber types, such as aspen, may be representative of old growth stands. In general, however, with the exception of Volk Field, old growth is limited on the Hardwood Range and proposed expansion area due to high water tables, logging, and fire. Future protection and management of white and red pine, and white, red, pin, and black oak would lead to older aged trees within the limits of site potential;
- Shearing following aspen sales, if necessary to stimulate regeneration;
- Extending oak harvest rotations on better sites, or leaving small stands of oak within aspen and jack pine cuts to increase habitat diversity;
- Regeneration of oak habitat using shelterwood cutting, group selection harvests, and clearcutting in conjunction with seeding to create uneven-aged stands;
- Seeding, brush control, and scarification of jack pine stands after harvest if necessary to maintain the jack pine-oak type habitat;
- Providing green cover (evergreen) for food, nesting habitat, and thermal cover by retaining
   10-30% conifers and associated understory where possible;
- Maintaining riparian zones along ditches and streams with a minimum of 100 feet width on
  each side of the waterway, and leaving large diameter hardwoods standing in the riparian
  zone for nest sites, perches and dens;
- Leaving a minimum of 4 snags greater than 6 inches diameter at breast height (dbh) per acre; over a 10 acre area 4 to 5 snags greater than 18 inches dbh, 10 to 15 trees greater

- than 14 inches dbh, and 20 to 25 snags greater than 6 inches dbh should be retained where possible;
- Retention of live reserve trees or islands of trees within each timber harvest for diversity and wildlife habitat value;
- Establishing a 330 feet "no-cut" buffer zone around any raptor nest or heron colony, and quarter-mile "no-activity" buffer zone around any active nesting herons and raptors, especially nesting bald eagles;
- Preserve, protect and manage wetlands in a manner that maintains their natural functions and values including minimizing adverse changes and enhancing water quality and quantity;
- Prairie establishment and barrens plant communities by removing brush and trees, fire,
   light grazing or chemical treatment;
- Hunting and hiking trail development;
- Restoration of pine barrens habitat if appropriate sites are identified;
- Management of healthy habitats for wildlife species which utilize later successional stages
  of the forest.





#### Legend:

MDW - Mixed Deciduous Woodland (including Dry Oak Woodland and Palustrine Forested Wetlands) PW - Pine Woodland

D - Disturbed (and Grasslands)
PSS - Palustrine Scrub-shrub Wetland (Shrub-Carr)

PEM - Palustrine Emergent Wetland



Scale: 1 inch = 2,000 feet

# **Vegetation Cover Map Existing Hardwood Range**

(MAP 1 OF 2)

Figure 3-8a





#### Legend:

MDW - Mixed Deciduous Woodland (including Dry Oak Woodland and Palustrine Forested Wetlands)

PW - Pine Woodland

D - Disturbed (and Grasslands)
PSS - Palustrine Scrub-shrub Wetland (Shrub-Carr)
PEM - Palustrine Emergent Wetland

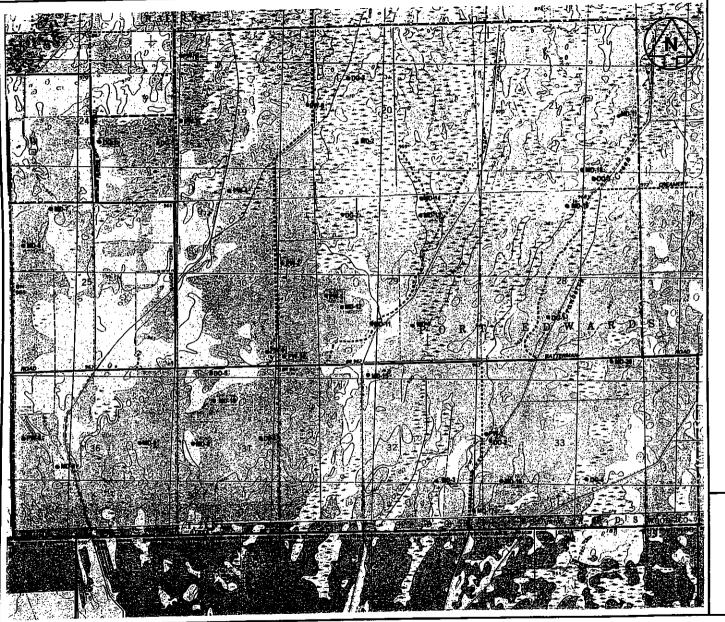


Scale: 1 inch = 2,000 feet

# **Vegetation Cover Map Existing Hardwood Range**

(MAP 2 OF 2)

Figure 3-8b





Legend:

MD - Mixed Deciduous Woodland (including Palustrine Forested Wetlands) DO - Dry Oak Woodland PW - Pine Woodland DG - Disturbed (and Grasslands)



Scale: 1 inch = 2,000 feet

Vegetation Habitat Sampling Sites **Proposed Expansion Area** 

Figure 3-10



#### Legend:

MD - Mixed Deciduous Woodland (including Dry Oak Woodland and Palustrine Forested Wetlands) PW - Pine Woodland

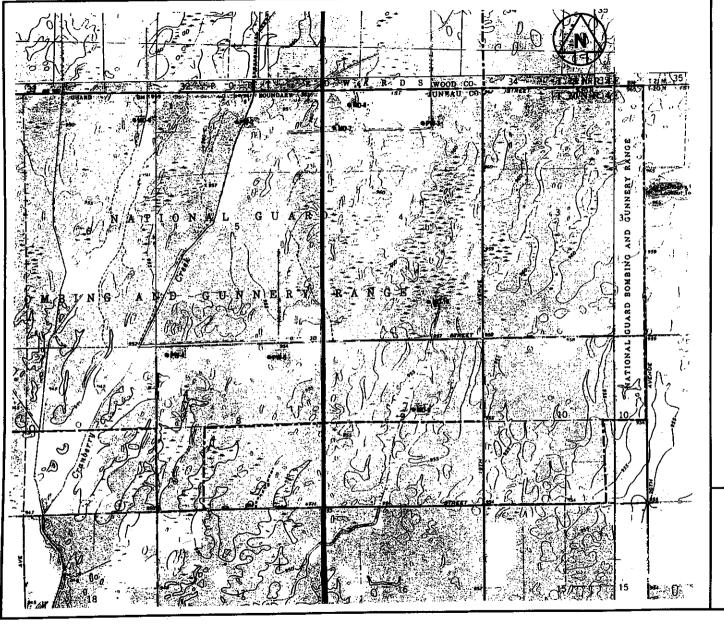
DG - Disturbed (and Grasslands)



Scale: 1 inch = 2,000 feet

Vegetation Habitat Sampling Sites **Existing Hardwood Range** 

Figure 3-11a





#### Legend:

MD - Mixed Deciduous Woodland (including Dry Oak Woodland and Palustrine Forested Wetlands)
 PW - Pine Woodland
 DG - Disturbed (and Grasslands)



Scale: 1 inch = 2,000 feet

**Vegetation Habitat** Sampling Sites

**Existing Hardwood Range** 

Figure 3-11b

### 3.5 FLORA AND FAUNA

### 3.5.1 Flora

No thorough field survey which cataloged plant species present was conducted on the proposed expansion area or Hardwood Range. The ILUMP (WIANG, 1994) contains a list of 160 plant species observed on the Volk Field in 1993 and in the original ILUMP (Chryst, 1987). More than 80 species occurring in that list were found on the proposed expansion area and Hardwood Range during the vegetation survey (Appendix C) and the results are discussed in sections 3.4.1 and 3.4.2. Field work was conducted from mid-July to late August for the biological survey, and a substantial number of species were probably overlooked because their senescence occurs in spring (April-June).

Discussion of potential occurrence of federal threatened, endangered, and state species of special concern occurs in section 3.5.3.

### 3.5.2 Fauna

Lists of potential and documented species of vertebrates (Appendix A) were synthesized from species observed incidentally in the field, existing species lists, published literature, the Volk Field and Hardwood Range ILUMP)(WIANG, 1994), and through phone conversations with people knowledgeable about species in the state and region (Appendix F).

Systematic faunal surveys on the proposed expansion area, Hardwood Range and Volk Field were limited to the Karner blue butterflies and nesting raptors (Appendix E). Incidental observations of rare species were also recorded on DNR Natural Heritage Inventory Program field report forms (Appendix E).

### Amphibians and Reptiles

The Volk Field and Hardwood Range ILUMP (WIANG, 1994) lists 29 potential and documented amphibian and reptile species (herpetiles) and are listed in Appendix A. Incidental observations made on the proposed expansion area during the three field periods occurring in July and August included eastern American toad (*Bufo americanus americanus*), western chorus frog (*Psuedacris triseriata triseriata*), northern spring peeper (*Psuedacris crucifer crucifer*), garter snake (*Thamnophis* sp.), northern red-bellied snake (*Storeria occipitomaculata*), and eastern smooth green snake (*Opheodrys vernalis vernalis*).

### Birds

The Volk Field and Hardwood Range ILUMP (1994) lists 221 potential and documented bird species, which are listed in Appendix A. Incidental observations of 87 species were made on the proposed expansion area between July 15 and September 2, 1996.

On July 15, 1996, the Wisconsin Army National Guard in Madison provided 2 hours of helicopter time to conduct aerial surveys for nesting raptors within the proposed expansion area and Hardwood Range. Two observers were used and the pilot was instructed to fly a zigzag pattern within 1/2-mile-wide transects, and where possible, at altitudes as low as approximately 150 feet. Aircraft speed was approximately 120 mph and transects were flown from south to north, proceeding in an easterly direction from the western boundary of the range and expansion area. It was necessary to maintain the aforesaid altitude and speed due to wind, payload, and overall weight of the aircraft, a Bell Jet Ranger.

No raptor nests were located at the Hardwood Range or the proposed expansion area. However, suitable nesting and winter roosting habitat consisting of snags and broken-top trees exists in the eastern half of the Hardwood Range and throughout the northeastern quarter of the proposed expansion area.

Suitable nesting and foraging habitat for raptors exists throughout the proposed expansion area, Hardwood Range, and along the perimeter of Volk Field. A juvenile red-

tailed hawk (*Buteo jamaicensis*) was repeatedly observed perched or leaving its perch south of County Line Road along the northern boundary of the Hardwood Range. Repeated observance of this hawk in the same general vicinity led field observers to suspect a possible nearby nest site; however, the attempt to locate the nest site was unsuccessful. A Cooper's hawk (*Accipter cooperi*) was observed on July 31 in a mixed deciduous forest type at the center of the proposed expansion area. During the vegetation survey at Volk Field, several red-tailed and broad-winged hawks (*Buteo platypterus*) and a sharp-shinned hawk (*Accipter striatus*) were observed soaring near the northern and eastern boundaries of the base.

### Mammals

The Volk Field and Hardwood Range 1994 ILUMP lists 58 potential and documented mammal species and is included as a list of potentially occurring species (Appendix A). Incidental observations or evidence of sign (tracks or fecal material) observed on the proposed expansion area during the three field periods occurring in July and August included eastern cottontail (Sylvilagus floridanus), least chipmunk (Tamias minimus), eastern chipmunk (Tamias striatus), thirteen-lined ground squirrel (Spermophilus tridecemlineatus), gray squirrel (Sciurus carolinensis), mink (Mustela vison), striped skunk (Mephitis mephitis), coyote (Canis latrans), red fox (Vulpes vulpes), raccoon (Procyon lotor), and white-tailed deer (Odocoileus virginianus).

# 3.5.3 Threatened and Endangered Species and Species of Special Concern

Information on federal and State threatened and endangered species and State species of special concern was obtained from the Wisconsin Natural Heritage Inventory (NHI), the U.S. Fish and Wildlife Service (FWS), DNR Bureau of Endangered Resources, published literature, the Volk Field and Hardwood Range ILUMP (WIANG, 1994), and through phone conversations with people knowledgeable about species in the state and region.

### Flora

The NHI (1995) listed 5 plant species as state threatened and 18 plant species as species of state special concern (Table 3-7). None of the species are listed as federally threatened or

endangered. The four state threatened species include wooly milkweed (Asceplias lanuginosa), brittle prickly-pear (Opuntia fragilis), tubercled orchid (Plantanthera flava var. Herbiola), bog bluegrass (Poa paludigena), and algal-leaved pondweed (Potamogeton confervoides).

Table 3-7. Potentially occurring federal and state threatened and endangered plant species on Hardwood Range, Volk Field, and proposed expansion area (E = Endangered; T = Threatened; SC = Species of concern).

| Common Name              | Scientific Name                 | Federal Status | WI Status |
|--------------------------|---------------------------------|----------------|-----------|
| Monocots .               |                                 |                |           |
| Bog bluegrass            | Poa paludigena                  | SC             | T         |
| Bog reed grass           | Calamagrostis stricta inexpansa | None           | SC        |
| Cluster Fescue           | Festuca paradoxa                | None           | SC        |
| Englemann spike-rush     | Eleocharis engelmannii          | None           | SC        |
| Livid sedge              | Carex cumulata                  | None           | SC        |
| Algal-leaved pondweed    | Potamogeton confervoides        | None           | T         |
| Vasey's pondweed         | Potamogeton vaseyi              | None           | SC        |
| Tubercled orchid         | Platanthera flava Herbiola      | None           | T         |
| White adder's mouth      | Malaxis brachypoda              | None           | SC        |
| Adder's-tongue           | Ophioglossum vulgatum var.      | None           | SC        |
| <u>Dicots</u>            |                                 |                |           |
| Missouri rockcress       | Arabis missouriensis            | None           | SC        |
| Dragon's mouth           | Arethusa bulbosa                | None           | SC        |
| Wooly milkweed           | Asceplias lanuginosa            | None           | T         |
| Screwstem                | Bartonia virginica              | None           | SC        |
| Water purslane           | Didilis diandra                 | None           | SC        |
| Farwell's water-milfoil  | Myriophyllum farwelli           | None           | SC        |
| Brittle prickly-pear     | Opuntia fragilis                | None           | T         |
| One-flowered broomrape   | Orobanche uniflora              | None           | SC        |
| Cross milkwort           | Polygala cruciata               | None           | SC        |
| Meadow beauty            | Rhexia virginica                | None           | SC        |
| Twin-stemmed bladderwort | Utricularia geminiscapa         | None           | SC        |
| Purple bladderwort       | Utricularia purpurea            | None           | SC        |

Source: Wisconsin Natural Heritage Inventory, Department of Natural Resources, Bureau of Endangered Resources

No plant surveys for threatened or endangered species or species of special concern were conducted. Tubercled orchid (*Plantanthera flava*) could occur on the expansion area and Hardwood Range because it is known to inhabit swampy woods or sometimes open moist ground, though usually it is found at seasonal pools. Bog bluegrass may occur, preferring swamps and wet woods, but it is usually found in sphagnum or other mossy areas located further north in the State (Voss, 1972). Brittle prickly-pear (*Opuntia fragilis*) and algal-leaved pondweed (*Potamogeton confervoides*) are less likely to occur because the sunny rock surfaces preferred by brittle prickly-pear and the generally deeper aquatic habitats preferred by pondweeds are not present.

#### Fauna

Of the 20 species listed by the NHI (1995), two species have federal status (Karner blue butterflies and bald eagle), 16 (including the bald eagle) have state threatened or endangered status, and 4 species are listed as state species of concern (Table 3-8).

# Karner Blue Butterfly

Habitat surveys to locate wild lupine (Lupinus perennis) used by the federally endangered Karner blue butterflies (Lycaerides melissa samuelis Nabokov) were conducted on the proposed expansion area July 12 to 16 and July 20 to 28, 1996.

Wild lupine ground surveys were conducted following the recommended methodology established by the DNR, Bureau of Endangered Resources (Bleser, 1993 and personal communication). Potential areas were first identified using 1995 color aerial photographs provided by Wood and Juneau County Farm Services Bureaus (1995) and then mapped on the Babcock and New Miner Quadrangle USGS topographic maps (1:24,000 scale). Sites with the highest potential occurred where previous disturbance could be readily observed, including previously logged areas, roadsides, drainage ditches, and a series of random locations. Limited habitat surveys were conducted on the eastern half of the existing Hardwood Range and no surveys were conducted on Volk Field. Surveys on Volk Field and Hardwood Range were conducted in 1995 and 1996 by WIANG personnel (Gonnering, 1996).

Table 3-8. Potentially occurring federal and state threatened and endangered animal species and state animal species of concern. (E = Endangered; T = Threatened; SC = Species of concern).

| Common Name                                       | Scientific Name                               | Federal Status | WI Status |  |
|---|---|----------------|-----------|--|
| Invertebrates                                     |   |                |           |  |
| Dusted skipper                                    | Atrytonopsis hianna                           | None           | SC        |  |
| Persius dusky wing                                | Erynnis persius persius                       | None           | SC        |  |
| Leonard's skipper                                 | Hesperia leonardus leonardus                  | None           | SC        |  |
| Buck moth   | Hemileuca maia                                | None           | SC        |  |
| Frosted elfin butterfly                           | Incisalia irus                                | None           | T         |  |
| Karner blue butterfly                             | Lycaeides melissa samuelis                    | E              | SC        |  |
| <u>Fish</u>                                       |   | ÷              | _         |  |
| Redfin shiner                                     | Lythrurus umbratilis                          | None           | <b>T</b>  |  |
| Redside dace                                      | Clinostomus elongatus                         | None           | T         |  |
| Amphibians and Reptiles Wood turtle               | Clemmys insculpta                             | None           | т         |  |
|   | * -   | SC             | T         |  |
| Blanding's turtle<br>Western slender glass lizard | Emydoidea blandingii<br>Ophisaurus attenuatus | None           | E         |  |
| Eastern massasauga rattlesnake                    | Sistrurus catenatus cantenatus                | SC             | E         |  |
| •   |   |                |           |  |
| Birds<br>Trumpeter swan                           | Olar buccinator                               | SC             | Т         |  |
| Greater prairie chicken                           | Tympanuchus cupido                            | None           | T.        |  |
| Yellow-crowned night heron                        | Nyctanassa violacea                           | None           | т         |  |
| Great egret                                       | Casemerodius albus                            | None           | т         |  |
| Red-shouldered hawk                               | Buteo lineatus                                | None           | T         |  |
| Bald eagle  | Haliaeetus leucocephalus                      | T              | T         |  |
| Osprey  | Pandion halietus None                         |                | T         |  |
| Barn owl  | Tyto alba None                                |                | E         |  |
| Acadian flycatcher                                | Empidonax virescens                           | None           | T         |  |
| Cerulean warbler                                  | Dendroica cerulea                             | SC             | T         |  |
| <u>Mammals</u>                                    |   |                |           |  |
| Timber wolf                                       | Canis lupus                                   | T              | T         |  |

Source: Wisconsin Natural Heritage Inventory, Department of Natural Resources, Bureau of Endangered Resources

In total, approximately 20 linear miles were surveyed on foot in order to verify the presence of lupine locations on the proposed expansion area. Another 4 linear miles were surveyed on the eastern portion of the Hardwood Range. A total of four previously undocumented wild lupine sites were located, mapped, and evaluated (Figure 3-13). The DNR's habitat evaluation forms for each of these sites were completed and are contained in Appendix E. In general, these patches can be characterized as low to moderately dense, but isolated. All sites were found in association with roadsides dominated by dry sandy soil and upland sites containing older oaks with a carex-dominated understory.

Transect counts to estimate relative abundance of Karner blue butterflies were also conducted on the four wild lupine sites located within the proposed expansion area. Surveys followed the presence/absence protocol developed by the NHI and the DNR Bureau of Endangered Resources (Bleser, personal communication).

No Karner blue butterflies were observed during either of the two surveys conducted during the butterfly's second flight period in late July. Survey protocol recommends that three surveys be conducted during the second flight period, and repeated during a 3 to 7 day interval. Because field personnel were granted access to Volk Field, Hardwood Range, and proposed expansion area until mid-July, a third survey could not be conducted by July 31, the last date recommended by DNR and FWS protocol for conducting Karner blue butterfly surveys. Although absence of Karner blue butterflies occurred during the first two surveys, it does not unequivocally preclude the existence of Karner blue butterflies at the proposed expansion area sites.

The Hardwood Range contains 11 Karner blue butterfly sites (Figure 3-14) in the generally open impact area in the western portion of the range (Gonnering, 1996). In 1995, three sites were considered high density sites, and five sites were considered medium density sites (Table 3-9). Seven sites occur in the impact area and five of those sites (4, 6, 7, 8, and 9) are concentrated in the southwestern portion of the impact area. The remaining four sites (1, 2, 3, and 11) are scattered in the wooded areas at the impact area's perimeter. During

1995, Karner blue butterflies were present at nine of the eleven sites. A fire in March 1996 destroyed one high density site (site 4) and partially destroyed a second high density site (site 6). Fire breaks were installed in April 1996 on all high density sites.

Volk Field contains six lupine sites (Figure 3-15), and in 1995 two sites were characterized as heavy density sites, two were characterized as medium density, and two were characterized as low density. In 1996, one medium site (site 2) was upgraded to a high density site, and the two low density (sites 3 and 6) were upgraded to medium density. To date, Volk Field lupine stands have not produced any Karner blue butterflies (Table 3-10).

Table 3-9. Results of the 1995 and 1996 wild lupine density and karner blue butterfly survey at Hardwood Range (m = male; f = female, unk.= unknown sex).

| Survey | Resuits   |  |
|--------|-----------|--|
| DUETUT | 1/C2011C2 |  |

|      |                     | 1995                                   |     |                                | 1996                                   |     |     |                                |        |
|------|---------------------|--|-----|--------------------------------|--|-----|-----|--------------------------------|--------|
| Site | Habitat             | Average number of individuals per site |     | Lupine<br>Density <sup>1</sup> | Average number of individuals per site |     |     | Lupine<br>Density <sup>1</sup> |        |
|      |                     | M                                      | F   | Unk                            |  | M   | F   | Unk                            |        |
| 1    | Mixed Deciduous     | 0.7                                    | 0   | 0                              | low                                    | 0   | 0   | 0                              | low    |
| 2    | Mixed Deciduous     | 0                                      | 0   | 0                              | low                                    | 0   | 0.4 | 0                              | low    |
| 3    | Mixed Deciduous     | 0                                      | 0   | 0                              | low                                    | 0   | 0   | 0                              | low    |
| 4    | Disturbed Grassland | 1.3                                    | 0   | 1.7                            | high                                   | 0.8 | 1.2 | 2.0                            | burned |
| 5    | Disturbed Grassland | 1.0                                    | 0   | 1.3                            | high                                   | 1.2 | 2.0 | 4.2                            | high   |
| 6    | Disturbed Grassland | 2.7                                    | 0   | 1.3                            | high                                   | 4.4 | 3.4 | 4.8                            | burned |
| 7    | Disturbed Grassland | 1.0                                    | 0.3 | 1.7                            | medium                                 | 1.2 | 0.2 | 1.2.                           | medium |
| 8    | Disturbed Grassland | 1.7                                    | 0   | 2.0                            | medium                                 | 1.0 | 0   | 1.2                            | medium |
| 9    | Disturbed Grassland | 0.7                                    | 0.7 | 0.3                            | medium                                 | 0.8 | 0.8 | 2.4                            | medium |
| 10   | Disturbed Grassland | 0.7                                    | 0.7 | 0.7                            | medium                                 | 3.4 | 1.0 | 2.0                            | medium |
| 11   | Aspen/Mixed         | 0.3                                    | 0   | 0                              | medium                                 | 1.4 | 0.6 | 1.8                            | medium |

<sup>&</sup>lt;sup>1</sup>Density estimates based on visual comparisons, no sampling conducted.

Source: Gonnering, D. 1996. Field Survey Results for the Karner blue butterflies. Unpublished report.

Table 3-10. Results of the 1995 and 1996 wild lupine density and karner blue butterfly survey at Volk Field.

| Survey  | Results  |
|---------|----------|
| JULITET | T/C3MIC3 |

|             |                     | 1995                                   |                                | 1996                                  |                   |  |
|-------------|---------------------|--|--------------------------------|---------------------------------------|-------------------|--|
| <u>Site</u> | Habitat             | Average number of individuals per site | Lupine<br>Density <sup>1</sup> | Average number of individual per site | Lupine<br>Density |  |
| 1           | Dry Oak Woodland    | 0                                      | high                           | 0                                     | high              |  |
| 2           | Dry Oak Woodland    | 0                                      | mediu <b>m</b>                 | 0                                     | high              |  |
| 3           | Dry Oak Woodland    | 0                                      | low                            | 0                                     | medium            |  |
| 4           | Disturbed Grassland | 0                                      | medium                         | 0                                     | medium            |  |
| 5           | Disturbed Grassland | 0                                      | high                           | 0                                     | high              |  |
| 6           | Disturbed Grassland | 0                                      | low                            | 0                                     | medium            |  |

<sup>&</sup>lt;sup>1</sup>Density estimates based on visual comparisons, no sampling conducted.

Source: Gonnering, D. 1996. Field Survey Results for the Karner blue butterflies. Unpublished report.

### Other Invertebrates

The state threatened frosted elfin butterfly (*Incisalia irus*) occurs as an associate of the Karner blue butterflies (Schweitzer, 1994). The species may occur on both the proposed expansion area and Hardwood Range in areas of high density lupine in woods openings. Habitat is limited on the expansion area and Hardwood Range, but higher density sites are present on Target Bluff on Volk Field. No surveys were conducted for frosted elfin butterflies since surveys need to coincide with the single flight period that occurs in mid-to-late May, just prior to the peak bloom period of lupine. Field personnel were not granted access to the proposed expansion area, existing Hardwood Range, and Volk Field until July, 1996.

NGB requested that information on the Wakita mysou ("arrowhead bug"), a member of the click beetle family (Elateridae), be assembled because of the important cultural relationship this invertebrate has to local Ho-Chunk (formerly Winnebago) tribal legend. There are approximately 885 species of elaterids in the U.S assigned to 73 genera; however, the identification of the specific elaterid species pertaining to Ho-Chunk folklore is difficult because few tribal members are recall more than the folklore surrounding this invertebrate. Identification has also been confounded largely by the fact that click beetles commonly occur in a broad range of vegetation habitats (Kondratieff, 1998). The larvae, known as wireworms,

are frequently feed on a wide variety of roots and some are carnivorous (Kondratieff, 1998). While it is likely that a number of species could occur in the diverse habitats found on and adjacent to the expansion area, Hardwood Range, and Volk Field, the NHI does not list any elaterids as a species of concern (Smith, 1998). Field work was not focused on click beetles because no species appeared on any requested state and federal lists.

### Fish

The redfin shiner (Lythrurus umbratilis), a state threatened species, is known to inhabit a variety of habitats including ditches having little current, relatively clear, warm water, and an abundance of submerged aquatic vegetation (Plieger, 1975). According to DNR (Zimmerman, 1996) and FWS (Zeckmeister, 1996), the redfin shiner is not likely to occur on either the proposed expansion area or Hardwood Range because the drainage ditches and Cranberry Creek are frequently too shallow and murky, may become dry before mid-summer, and are subject to severe winter conditions that would limit fish survival.

# Amphibians and Reptiles

The state endangered western slender glass lizard (*Ophisaurus attenuatus*) is associated with dry-mesic prairies and savannas, which occur in patches on Volk Field. The state endangered Eastern massasauga rattlesnake (*Sistrurus catenatus cantenatus*), and state threatened wood turtle (*Clemmys insculpta*) and Blanding's turtle (*Emydoidea blandingii*) are likely to occur due to the presence of moist habitats and drainages found throughout the proposed expansion area and Hardwood Range. The rivers, creeks, and ditches of the Yellow River drainage that occur throughout the area and surround the proposed expansion area and Hardwood Range not only provide important breeding habitat for these species, but also provide migration and dispersal corridors.

# Birds (other than raptors)

The trumpeter swan (Olar buccinator), a federal species of concern and state endangered species, the state threatened great egret (Casemerodius albus), yellow-crowned night heron (Nyctanassa violacea), acadian flycatcher (Empidonax virescens), and greater

prairie chicken (*Tympanuchus cupido*), and the cerulean warbler (*Dendroica cerulea*), a federal species of concern and state threatened species, may occur in the proposed expansion area and Hardwood Range. No surveys for these species were conducted, and none were observed during any field survey periods. However, as discussed below, habitats suitable for four of these species (great egret, yellow-crowned night heron, cerulean warbler, and greater prairie chicken) occurs at the proposed expansion area and Hardwood Range.

Both the great egret and yellow-crowned night heron could occur where the tree canopy is open along the drainage ditches and Cranberry Creek at both sites. Acadian flycatchers are uncommon and generally occur in mature woodlands, which are generally lacking on both the proposed expansion area and Hardwood Range. Open hardwood stands that are either upland or along streams could provide suitable habitat for the cerulean warbler within both sites. Greater prairie chickens prefer pastures, hayfields and dry open woodlands that only occur in limited proportions on the western boundary of the proposed expansion area.

A demonstration population of trumpeter swans has been reintroduced to the Sandhill State Wildlife Area, about 5 miles northwest of the proposed expansion area, and another reintroduction has been proposed for Necedah NWR. Deep water habitats that could support nesting trumpeter swans are not present on either the proposed expansion area or Hardwood Range.

# Raptors

The FWS (letter from Janet Smith, Field Supervisor, FWS, Green Bay, Wisconsin, July 11, 1995) and the NHI indicated that the federally endangered and state threatened bald eagle (Haliaeetus leucocephalus), federally and state endangered peregrine falcon (Falco peregrinus), state endangered barn owl (Tyto alba), and state threatened osprey (Pandion halietus) and red-shouldered hawk (Buteo lineatus) could occur in the vicinity of the proposed expansion area and Hardwood Range. During the aerial helicopter survey, an adult red-shouldered hawk was observed perched on a snag adjacent to a wetland in the southeastern portion of the Hardwood Range (Appendix E). An adult bald eagle was observed soaring

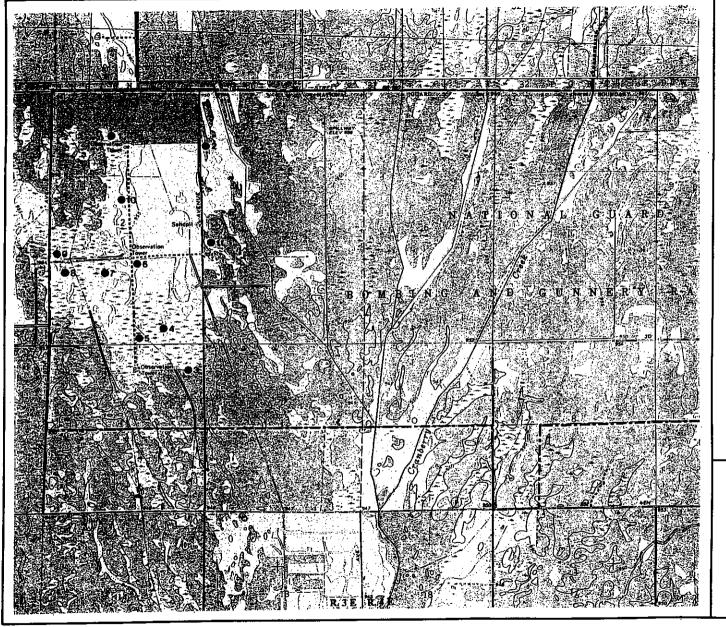
above tree line in late August in the southeast portion of the proposed expansion area (Appendix E).

No nests for either bald eagles, ospreys, or red-shouldered hawks were identified. Numerous snags located adjacent to wetlands and throughout the interior of both the proposed expansion area and Hardwood Range have suitable nesting, roosting, and perching sites. However, suitable deep water habitat that supports prey species favored by bald eagles and ospreys, is present but limited at the proposed expansion area and Hardwood Range, and neither species would be expected to nest, except incidentally. Wintering bald eagles could occur at the proposed expansion area and Hardwood Range where adequate roost sites and food resources (e.g., deer carrion, rabbits) are available. No suitable nesting sites (high, steep-walled cliffs) occur for peregrine falcons, though suitable foraging habitat exists throughout the proposed expansion area and Hardwood Range.

Barn owls prefer open landscapes and could occur in and around the buildings, hayfields, and meadows on the western boundary of the proposed expansion area. No owls were observed during any field survey period. Temple (1987) considers barn owls uncommon state-wide, but indicates they occur with somewhat greater local frequency in Wood and Juneau counties.

### Mammals

The federally and state endangered timber wolf (Canis lupus) is known to occur in the southwest corner of Wood County and in Juneau County (FWS, 1995) and a small pack was reported on the northern edge of the Necedah National Wildlife Refuge (King, 1996). The dense habitat, abundance of preferred prey species, and relatively low human disturbances on Wood County CFL could provide suitable wolf habitat on the proposed expansion area. Despite suitable habitat and prey on Hardwood Range, the level of human activity may generally deter wolves from making extensive use of the range. No wolves or wolf sign were observed during the survey period.





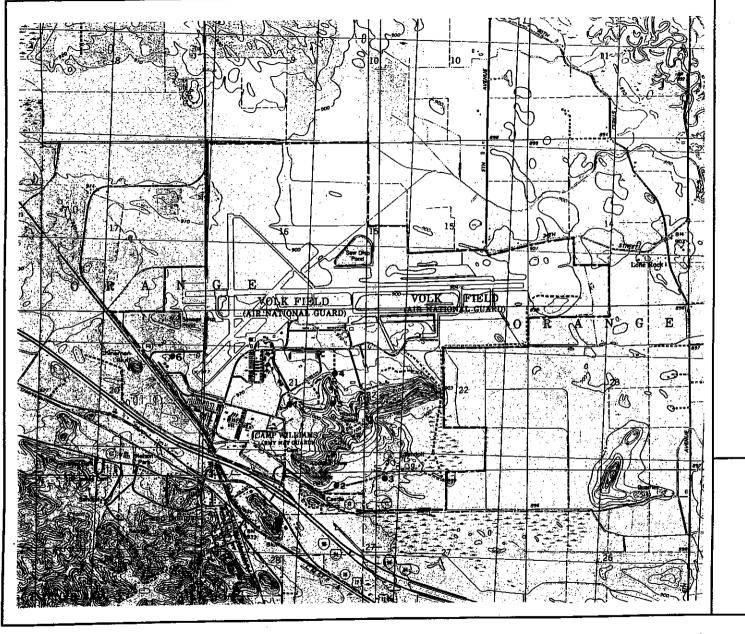


Scale: 1 inch = 2,000 feet

Karner Blue Butterfly Habitat Sites

**Existing Hardwood Range** 

Figure 3-14







Scale: 1 inch = 2,000 feet

Karner Blue Butterfly Habitat Sites

Volk Field

Figure 3-15

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  Services. April 26.

### 5.0 LIST OF INDIVIDUALS CONTACTED

| Contact Name               | Position/Agency  | Location             | Information Provided   |
|----------------------------|--|----------------------|--|
| Cathy Bleser               | Endangered Species Biologist, DNR, Bureau of Endangered Resources  | Madison, WI          | Karner blue butterfly and frosted elfin butterfly                                      |
| Customer Service<br>Center | Photo Science, Inc.  | Gaithersburg, MD     | Aerial photography   |
| Dale Dorrow                | Supervisory Forester, DNR Juneau County Dept. of Forestry and Parks                                      | Mauston, WI          | Information on Juneau County soils,<br>County forest lands, wildlife                   |
| Eric Epstein               | Heritage Ecologist,<br>DNR, Bureau of<br>Endangered Resources  | Madison, WI          | Information on biological information.   |
| Bob Foster                 | Pilot, USFWS   | Minneapolis, MN      | Aerial photography   |
| Dan Gonnering              | Natural Resource Specialist, Combat Readiness Training Center - Volk Field                               | Camp Douglas, WI     | Information on biological resources, aerial photography, vegetation complexes          |
| Steve Grant                | Forester, DNR-Wood<br>County Dept. of<br>Forestry and Parks  | Wisconsin Rapids, WI | Information on Wood County soils,<br>County forest lands, wildlife                     |
| Joe Haug                   | Wildlife Manager, DNR  | Wisconsin Rapids, WI | Birds, mammals and other contacts  |
| Robert Hay                 | Non-game Herpetologist, DNR, Bureau of Endangered Resources  | Madison, WI          | Lists of herpetiles for entire state and localized range maps where species documented |
| Richard King               | Wildlife Biologist,<br>USFWS, Necedah<br>National Wildlife<br>Refuge                                     | Necedah, WI          | Bird list, herpetiles, Karner blue<br>butterfly, vegetation                            |
| Steve Klauth               | Curator, Entomology<br>Collection, University of<br>Wisconsin  | Madison, WI          | Invertebrate information   |
| Joan Koblyski              | Juneau County Farm<br>Services Agency<br>(USDA)  | Mauston, WI          | Color and black-and-white aerial photography of Hardwood Range and Volk Field          |
| Boris Kondratieff          | Professor and Curator, Dept. of Bio-agricultural Sciences and Pest Management, Colorado State University | Fort Collins, CO     | Invertebrate species including click beetles   |
| Debbie Marchi              | HAS Images   | Dayton, OH           | Aerial photography   |
| Phil Pellitteri            | Entomologist, Dept. of<br>Entomology, Insect<br>Diagnostic Lab,<br>University of Wisconsin               | Madison, WI          | Invertebrate identification and information  |

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| Contact Name      | Position/Agency  | Location             | Information Provided  |
|-------------------|--|----------------------|---|
| Paul Pingrey      | Forester, DNR, Juneau<br>County Land, Forestry<br>and Parks Dept.  | Mauston, WI          | Information on Juneau County forest management, soils, wildlife   |
| John Pohlman      | Program Director,<br>DNR, Natural Heritage<br>Inventory Program  | Madison, WI          | Information of threatened and endangered species, species of special concern, survey protocol           |
| Debbie Sandberg   | Wood County Farm<br>Services Agency<br>(USDA)  | Wisconsin Rapids, WI | Color and black-and-white aerial photography of the proposed Expansion Area                             |
| Dave Seibert      | Compliance Biologist,<br>DNR, Bureau of<br>Endangered Resources  | Madison, WI          | Information on threatened and endangered species survey protocol.                                       |
| William Smith     | Zoologist, DNR,<br>Natural Heritage<br>Inventory Program   | Madison, WI          | Information threatened and endangered species   |
| Elizabeth Spencer | Environmental Review Technician, DNR, Natural Heritage Inventory Program                                   | Madison, WI          | Data base request from NHI  |
| Lois Stoerzer     | Supervisory Biologist,<br>DNR, Bureau of Water<br>Regulation and Zoning,<br>Wisconsin Wetland<br>Inventory | Madison, WI          | Provided state Wetland Inventory<br>maps for the proposed Expansion<br>Area, Hardwood Range, Volk Field |
| Joel Trick        | Fish and Wildlife<br>Biologist, USFWS  | Green Bay, WI        | Information on locating Karner blue butterfly habitat, survey protocol                                  |
| Paul Westegaarde  | Forester, DNR-Wood<br>County Dept. of<br>Forestry and Parks  | Wisconsin Rapids, WI | Information on Wood County forest management, soils, wildlife   |
| Mike Zeckmeister  | Fisheries Biologist, DNR Sandhill State Wildlife Area  | Finley, WI           | Information on local fisheries  |
| Jack Zimmerman    | Fisheries Biologist,<br>DNR  | Wisconsin Rapids, WI | Information on local fisheries  |

#### **APPENDIX A:**

LIST OF FAUNA
POTENTIALLY OCCURRING
AT
THE PROPOSED EXPANSION AREA,
HARDWOOD RANGE, AND
VOLK FIELD

## AMPHIBIANS AND REPTILES POTENTIALLY OCCURRING ON THE PROPOSED EXPANSION AREA, HARDWOOD RANGE, AND VOLK FIELD (\* indicates species observed)

#### **SPECIES**

#### **SCIENTIFIC NAME**

Blue-spotted Salamander Ambystoma laterale

\*Eastern Tiger Salamander Ambystoma tigrinum

Central Newt Notophthalmus virldescens louisianenis

\*Eastern American Toad Bufo americanus americanus

\*Western Chorus Frog Pseudacris triseriata triseriata

\*Northern Spring Peeper Pseudacris [= Hyla] crucifer crucifer

Eastern Gray Treefrog Hyla versicolor

Cope's Gray Treefrog Hyla chrysoscelis

Green Frog Rana clamitans melanota

\*Northern Leopard Frog Rana pipiens

\*Wood Frog Rana sylvatica

Snapping Turtle Chetydra serpentina

\*Painted Turtle Chrysemys picta

Western Slender Glass Lizard Ophisaurus attenuattus

Five-lined Skink Eumeces fasciatus

Eastern Hognose Snake Heterodon platyrhinos

\*Eastern Smooth Green Snake Opheodrys vernalis vernalis

Blue Racer Coluber constrictor foxi
Western Fox Snake Elaphe vulpina vulpina

\*Eastern Milk Snake Lampropeltis triangulum triangulum

\*Eastern Garter Snake Thamnophis sirtalis

Eastern Plains Garter Snake Thamnophis radix
Brown Snake Storeria dekayi

Northern Red-bellied Snake Storeria occipitomaculata

Northern Water Snake Nerodia sipedon sipedon

(\* indicates species observed or identified by call)

| <u>SPECIES</u>            | SCIENTIFIC NAME       | RESIDENT<br>STATUS | OCCURRENCE<br>LIKELIHOOD |
|---------------------------|-----------------------|--------------------|--------------------------|
| Common Loon               | Gavia immer           | T                  | 3                        |
| Pied-billed Grebe         | Podilymbus podiceps   | S                  | 1                        |
| Horned Grebe              | Podiceps auritus      | S                  | 3                        |
| Double-crested Cormorant  | Phalacrocorax auritus | <b>. T</b>         | 3                        |
| American Bittern          | Botaurus lentiginosus | S                  | 2                        |
| Least Bittern             | Ixobrychus exilis     | S                  | 3                        |
| *Great Blue Heron         | Ardea herodias        | S                  | 2                        |
| Snowy Egret               | Egretta thula         | · <b>T</b>         | 3                        |
| Cattle Egret              | Bubulcus ibis         | T                  | 3                        |
| Green-backed Heron        | Butorides striatus    | S                  | 1                        |
| Black-crowned Night Heron | Nyeticorax nyeticorax | T                  | 3                        |
| Tundra Swan               | Cygnus columbianus    | T                  | 2                        |
| Snow Goose                | Chen caerulescens     | T                  | .2                       |
| *Canada Goose             | Branta canadensis     | S                  | 1                        |
| *Wood Duck                | Aix sponsa            | S                  | 1                        |
| *Green-winged Teal        | Anas crecca           | S                  | 1                        |
| *American Black Duck      | Anas rubripes         | Ś                  | 1                        |
| *Mallard                  | Anas platyrhynchos    | S                  | 1                        |
| Northern Pintail          | Anas acuta            | S                  | 3                        |
| *Blue-winged Teal         | Anas discors          | S                  | 1                        |
| *Northern Shoveler        | Anas clypeata         | T                  | 2                        |
| *Gadwall                  | Anas strepera         | _ <b>T</b>         | 2                        |
| *American Wigeon          | Anas americana        | S                  | 2                        |
| Canvasback                | Aythya valisineria    | T                  | 2                        |

#### **RESIDENT STATUS:**

T = Transient (migratory, usually non-breeding season)

S = Seasonal (Breeding season)

R = Resident (year round)

#### OCCURRENCE LIKELIHOOD:

1 = Very likely

2 = Likely

(\* indicates species observed or identified by call)

| <u>SPECIES</u>         | SCIENTIFIC NAME          | RESIDENT<br>STATUS | OCCURRENCE<br>LIKELIHOOD |
|------------------------|--------------------------|--------------------|--------------------------|
| Redhead                | Aythya americana         | T                  | 2                        |
| *Ring-necked Duck      | Aythya collards          | T                  | 2                        |
| Greater Scaup          | Aythya marila            | T                  | 3                        |
| *Lesser Scaup          | Aythya affinis           | T                  | 1                        |
| Oldsquaw               | Clangula hysmalis        | T                  | 3                        |
| Common Goldeneye       | Bucephala clangula       | T                  | 2                        |
| Bufflehead             | Bucephala albeola        | T                  | 2                        |
| Hooded Merganser       | Lophodytes cacullatus    | S                  | 2                        |
| Common Merganser       | Mergus merganser         | T                  | 3                        |
| Red-breasted Merganser | Mergus serrator          | T                  | 3                        |
| Ruddy Duck             | Oxyura jamaicensis       | T                  | 3                        |
| *Turkey Vulture        | Cathartes aura           | S                  | 2                        |
| Northern Harrier       | Circus cyaneus           | S                  | 3                        |
| *Sharp-shinned Hawk    | Accipiter striatus       | T                  | 2                        |
| *Cooper's Hawk         | Accipiter cooperii       | R                  | 2                        |
| Northern Goshawk       | Accipiter gentilis       | T                  | 3                        |
| *Broad-winged Hawk     | Buteo platypterus        | S                  | 1                        |
| *Red-tailed Hawk       | Buteo jamaicensis        | R                  | 1                        |
| Rough-legged Hawk      | Buteo lagopus            | T                  | 2                        |
| Golden Eagle           | Aquila chrysoetos        | T                  | 3                        |
| *American Kestrel      | Falco sparverius         | R                  | 1                        |
| Merlin                 | Falco columbarius        | T                  | 3                        |
| Ring-necked Pheasant   | Phasianus colchicus      | R                  | 2                        |
| *Ruffed Grouse         | Bonasa umbellus          | R                  | 1                        |
| Sharp-tailed Grouse    | Tympanuchus phasianellus | T                  | 3                        |

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#### OCCURRENCE LIKELIHOOD:

1 = Very likely

2 = Likely

(\* indicates species observed or identified by call)

| SPECIES                | SCIENTIFIC NAME            | RESIDENT<br>STATUS | OCCURRENCE<br>LIKELIHOOD |
|------------------------|----------------------------|--------------------|--------------------------|
| *Wild Turkey           | Meleagris gallopavo        | R                  | 1                        |
| Northern Bobwhite      | Colinus virginianus        | R                  | 3                        |
| Yellow Rail            | Coturnicops noveboracensis | T                  | 3                        |
| Virginia Rail          | Rallus limicola            | S                  | 2                        |
| Sora                   | Porzana carolina           | S                  | 1                        |
| Common Moorhen         | Gallinula chloropus        | T                  | 3                        |
| *American Coot         | Fulica americana           | S                  | 1                        |
| *Sandhill Crane        | Grus canadensis            | S                  | 1                        |
| Black-bellied Plover   | Plavialis squatarola       | T                  | 3                        |
| Lesser Golden Plover   | Plavialis dominica         | T                  | 3                        |
| Semi- palmated Plover  | Charadrius semipalmatus    | T                  | 3                        |
| Killdeer               | Charadrius vociferus       | S                  | 1                        |
| American Avocet        | Recurvirostra americana    | T                  | 3                        |
| Greater Yellowlegs     | Tringa melanoleuca         | T                  | 3                        |
| Lesser Yellowlegs      | Tringa flavipes            | T                  | 1                        |
| *Solitary Sandpiper    | Tringa solitaria           | T                  | 2                        |
| Spotted Sandpiper      | Actitis macularia          | S                  | 1                        |
| Upland Sandpiper       | Bartramia longicauda       | S                  | 3                        |
| Hudsonian Godwit       | Limosa haemastica          | T                  | . 3                      |
| Marbled Godwit         | Limosa fedoa               | T                  | 3                        |
| Semipalmated Sandpiper | Calidris pusilla           | T                  | 3                        |
| Western Sandpiper      | Caliris mauri              | T                  | 3                        |
| Least Sandpiper        | Calidris minutilla         | T                  | 2                        |
| White-rumped Sandpiper | Calidris fuscicollis       | T                  | 3                        |
| Pectoral Sandpiper     | Calidris melanotos         | τ                  | 1                        |
| Dunlin                 | Calidris alpina            | T                  | 3                        |

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| <u>SPECIES</u>          | SCIENTIFIC NAME          | RESIDENT<br>STATUS | OCCURRENCE<br>LIKELIHOOD |
|-------------------------|--------------------------|--------------------|--------------------------|
| Stilt Sandpiper         | Calidris himantopus      | T                  | 3                        |
| Buff-breasted Sandpiper | Tryngites subruficollis  | T                  | 3                        |
| Short-billed Dowitcher  | Limnodromus griseus      | T                  | 3                        |
| Long-billed Dowitcher   | Limnodromus scolopaceus  | T                  | 3                        |
| Common Snipe            | Gallinago gallinago      | S                  | 1                        |
| *American Woodcock      | Scolopax minor           | S                  | 1                        |
| Wilson's Phalarope      | Phalaropus tricolor      | <b>T</b> .         | 3                        |
| Red-necked Phalarope    | Phalaropus lobatus       | T                  | 3                        |
| Bonaparte's Gull        | Larus philadelphia       | T                  | 3                        |
| Ring-billed Gull        | Larus delawarensis       | T                  | 2                        |
| Herang Gull             | Larus argentatus         | T                  | . 3                      |
| Black Tern              | Chlidonias niger         | S                  | 2                        |
| *Rock Dove              | Columba livia            | R                  | 1                        |
| *Mourning Dove          | Zenaida macroura         | R                  | 1                        |
| *Black-billed Cuckoo    | Coccyzus erythropthalmus | S                  | 1                        |
| Yellow-billed Cuckoo    | Cocoyzas americanus      | S                  | 2                        |
| Eastern Screech Owl     | Otus asio                | R                  | 3                        |
| *Great Horned Owl       | Bubo virginianus         | R                  | 1                        |
| Snowy Owl               | Nyetea scandiaca         | T                  | 3                        |
| Barred Owl              | Strix varia              | R                  | 1                        |
| *Long-eared Owl         | Asio otus                | R                  | 2                        |
| Short-eared Owl         | Asio flammeus            | <b>T</b>           | 3                        |
| Northern Saw-whet Owl   | Aegolius acadicus        | R                  | 3                        |
| *Common Nighthawk       | Chordeiles minor         | S                  | 1                        |
| *Whip-poor-will         | Caprimulgus vociferus    | S                  | 1                        |

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| <u>SPECIES</u>                | SCIENTIFIC NAME            | RESIDENT<br>STATUS | OCCURRENCE<br>LIKELIHOOD |
|-------------------------------|----------------------------|--------------------|--------------------------|
| Chimney Swift                 | Chaetura pelagica          | S                  | 2                        |
| Ruby-throated Hummingbird     | Archilochus colubris       | S                  | 2                        |
| *Belted Kingfisher            | Ceryle alcyon              | S                  | 1                        |
| *Red-headed Woodpecker        | Melanerpes erythrocephalus | R                  | 1                        |
| Red-bellied Woodpecker        | Melanerpes carolinus       | R                  | 2                        |
| Yellow-bellied Sapsucker      | Sphyrapicus varius         | S                  | 2                        |
| *Downy Woodpecker             | Picoides pubescens         | R                  | 1                        |
| *Hairy Woodpecker             | Picoides villosus          | R                  | 1                        |
| *Northern Flicker             | Colaptes auratus           | · <b>S</b>         | 1                        |
| Pileated Woodpecker           | Dryocopus pileatus         | R                  | 2                        |
| Olive-sided Flycatcher        | Contopus borealis          | T                  | 3                        |
| *Eastern Wood-Pewee           | Contopus virens            | S                  | 1                        |
| Yellow-bellied Flycatcher     | Empidonax flaviventris     | T                  | 3                        |
| Alder Flycatcher              | Empidonax alnorum          | S                  | 2                        |
| Willow Flycatcher             | Empidonax traili           | S                  | 3                        |
| *Least Flycatcher             | Empidonax minimus          | · <b>S</b>         | 1 .                      |
| *Eastern Phoebe               | Sayornis phoebe            | S                  | 1                        |
| Great Crested Flycatcher      | Myiarchus crinitus         | S                  | 1                        |
| *Eastern Kingbird             | Tyrannus tyrannus          | S                  | 1 .                      |
| *Horned Lark                  | Eremophila alpestris       | S                  | 1                        |
| Purple Martin                 | Progne subis               | S                  | 3                        |
| *Tree Swallow                 | Tachycineta bicolor        | S                  | 1                        |
| Northern Rough-winged Swallow | Stelgidopteryx serripennis | S                  | 2                        |
| *Bank Swallow                 | Riparia riparia            | . <b>S</b>         | 2                        |
| Cliff Swallow                 | Hirundo pyrrhonota         | S                  | 2                        |
| *Barn Swallow                 | Hirundo rustica            | S                  | 1                        |

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| <u>SPECIES</u>           | SCIENTIFIC NAME         | RESIDENT<br><u>STATUS</u> | OCCURRENCE<br>LIKELIHOOD |
|--------------------------|-------------------------|---------------------------|--------------------------|
| *Blue Jay                | Cyanocitta cristata     | Ŕ                         | 1                        |
| *American Crow           | Corvus brachyrhynchos   | R                         | 1                        |
| Common Raven             | Corvus corax            | R                         | 3                        |
| *Black-capped Chickadee  | Parus atricapillus      | R                         | 1                        |
| Tufted Titmouse          | Parus bicolor           | R                         | 3                        |
| *Red-breasted Nuthatch   | Sitta canadensis        | T                         | 2                        |
| *White-breasted Nuthatch | Sitta carolinensis      | R                         | · 1                      |
| Brown Creeper            | Certhia americana       | T                         | 2                        |
| *House Wren              | Troglodytes aedon       | S                         | 1                        |
| Winter Wren              | Troglodytes troglodytes | T                         | 2                        |
| Sedge Wren               | Cistothorus platensis   | S                         | 3                        |
| Marsh Wren               | Cistothorus palustris   | S                         | 2                        |
| Golden-crowned Kinglet   | Regulus satrapa         | T                         | 2                        |
| Ruby-crowned Kinglet     | Regulus calendula       | T                         | 1                        |
| Blue-gray Gnatcatcher    | Polioptila caerulea     | S                         | 3                        |
| *Eastern Bluebird        | Sialia sialis           | S                         | 2                        |
| *Veery                   | Catharus fuscescens     | S                         | 1                        |
| Gray-cheeked Thrush      | Catharus minimus        | T                         | 2                        |
| Swainson's Thrush        | Catharus ustulatus      | T                         | 2                        |
| Hermit Thrush            | Catharus guttatus       | T                         | 2                        |
| *American Robin          | Turdus migratorius      | S                         | 1                        |
| *Gray Catbird            | Dumetella carolinensis  | S                         | 1                        |
| Northern Mockingbird     | Mimus polyglottos       | T                         | 3                        |
| Brown Thrasher           | Toxostoma rufum         | S                         | 1                        |
| American Pipit           | Anthus rubescens        | T                         | 3                        |
| Bohemian Waxwing         | Bombycilla garrulus     | T                         | 3                        |

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|-------------------------|------------------------|--------------------|--------------------------|
| Cedar Waxwing           | Bombycilla cedrorum    | R                  | 1                        |
| Northern Shrike         | Lanius excubitor       | T                  | 2                        |
| Loggerhead Shrike       | Lanius ludovicianus    | S                  | . 3                      |
| *European Starling      | Sturnus rulgaris       | R                  | 1                        |
| *Solitary Vireo         | Vireo solitarius       | T                  | 2                        |
| Yellow-throated Vireo   | Vireo flavifrons       | S                  | 2                        |
| *Warbling Vireo         | Vireo gilvus           | S                  | 2                        |
| Philadelphia Vireo      | Vireo philadephicus    | T                  | 3                        |
| Red-eyed Vireo          | Vireo olivaceus        | S                  | 1                        |
| Blue-winged Warbler     | Vermivora pinus        | S                  | 3                        |
| Golden-winged Warbler   | Vermivora chrysoptera  | S                  | 2                        |
| *Tennessee Warbler      | Vermivora peregrina    | T                  | 1                        |
| Orange-crowned Warbler  | Vermivora cleata       | T                  | 3                        |
| Nashville Warbler       | Vermivora rufcapilla   | T                  | 1                        |
| Northern Parula         | Parula americana       | T                  | 3                        |
| *Yellow Warbler         | Dendroica petechia     | S                  | 1                        |
| Bay-breasted Warbler    | Dendroica castanea     | T                  | 2                        |
| Cerulean Warbler        | Denrdoica cerulea      | S                  | 3                        |
| Black-and-white Warbler | Mniotilta varia        | S                  | 2                        |
| American Redstart       | Setophaga ruticilla    | S                  | 2                        |
| *Ovenbird               | Seiurus aurocapillus   | S                  | 1                        |
| Northern Waterthrush    | Seiurus noveboracensis | T                  | 2                        |
| Louisiana Waterthrush   | Seiurus motacilla      | S                  | 3                        |
| Connecticut Warbler     | Oporornis agilis       | T                  | 3                        |
| Mourning Warbler        | Oporornis philadelphia | T                  | 2                        |
| *Cormnon Yellowthroat   | Geothlypis trichas     | S                  | 1                        |

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|-------------------------|--------------------------|--------------------|--------------------------|
| Wilson's Warbler        | Wilsonia pusilla         | <b>T</b> -         | 3                        |
| Canada Warbler          | Wilsonia canadensis      | T                  | 3                        |
| *Scarlet Tanager        | Piranga olivacea         | S                  | 1                        |
| Northern Cardinal       | Cardinalis cardinalis    | S                  | 1                        |
| Rose-breasted Grosbeak  | Pheuticus ludovicianus   | S                  | 1                        |
| Indigo Bunting          | Passerina cyanea         | S                  | 1                        |
| Dickcissel              | Spiza americana          | S                  | 1                        |
| *Rufous-sided Towhee    | Pipilo erythrophthalmus  | S                  | 1                        |
| *American Tree Sparrow  | Spizella arborea         | T                  | 1                        |
| *Chipping Sparrow       | Spizella passerina       | S                  | 1                        |
| *Clay-colored Sparrow   | Spizella pallida         | S                  | 2                        |
| *Field Sparrow          | Spizella pusilla         | S                  | 1                        |
| *Vesper Sparrow         | Pooecetes gramineus      | S                  | 1                        |
| Lark Sparrow            | Chondestes grammacus     | T                  | 3                        |
| Savannah Sparrow        | Passerculus sandwichenis | S                  | 2                        |
| Grasshopper Sparrow     | Ammodramus savannarum    | S                  | 3                        |
| Henslow's Sparrow       | Ammodramus henslowii     | S                  | 3                        |
| LeConte's Sparrow       | Ammodramus leconteii     | S                  | 3                        |
| Fox Sparrow             | Passerella iliaca        | T                  | 2                        |
| *Song Sparrow           | Melospiza melodia        | S                  | 1                        |
| Lincoln's Sparrow       | Melospiza lincolnli      | T                  | 3                        |
| Swamp Sparrow           | Melospiza georgiana      | S                  | 1                        |
| *White-throated Sparrow | Zonotrichia albicollis   | T                  | 1                        |
| *White-crowned Sparrow  | Zonotrichia leucophrys   | <b>T</b>           | 2                        |
| Harris' Sparrow         | Zonotrichia querula      | T                  | 3                        |
| *Dark-eyed Junco        | Junco hyemalis           | Т                  | 1                        |

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|-------------------------|------------------------------|--------------------|--------------------------|
| Lapland Longspur        | Calcarius lapponicus         | T                  | 2                        |
| Snow Bunting            | Plectrophenax nivalis        | T                  | 2                        |
| *Bobolink               | Dolichonyx oryzivorus        | S                  | 2                        |
| *Red-winged Blackbird   | Agelaius phoeniceus          | S                  | 1                        |
| *Eastem Meadowlark      | Sturnella magna              | S                  | 2                        |
| Western Meadowlark      | Sturnella neglecta           | S                  | 2                        |
| Yellow-headed Blackbird | Xanthocephalus xanthocephalu | ıs S.              | 3                        |
| Rusty Blackbird         | Euphagus carolinus           | T                  | 2                        |
| *Brewer's Blackbird     | Euphasus cyanocephalus       | T                  | 2                        |
| *Common Grackle         | Quiscalus quiscula           | <b>S</b>           | 1                        |
| *Brown-headed Cowbird   | Molothrus ater               | <b>S</b> .         | 1                        |
| *Northern Oriole        | Icterus galbula              | S                  | 1                        |
| Pine Grosbeak           | Pinicola enucleator          | T                  | 3                        |
| *Purple Finch           | Carpodacus purpureus         | T                  | 2                        |
| *House Finch            | Carpodacus mexicanus         | R                  | 2                        |
| Red Crossbill           | Loxia curvirostra            | S                  | 3                        |
| White-winged Crossbill  | Loxia leucoptera             | T                  | 3                        |
| Common Redpoll          | Carduelis flammea            | T                  | 2                        |
| Hoary Redpoll           | Carduelis hornemanni         | T                  | 3                        |
| *Pine Siskin            | Carduelis pinus              | T                  | 2                        |
| *American Goldfinch     | Carduelis tristis            | S                  | 1                        |
| *Evening Grosbeak       | Coccothraustes vespertinus   | <b>T</b> , ,       | 2                        |
| *House Sparrow          | Passer domesticus            | R                  | 2                        |

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## MAMMALS POTENTIALLY OCCURING ON THE PROPOSED EXPANSION AREA, HARDWOOD RANGE, AND VOLK FIELD (\* indicates species or sign observed)

| <u>SPECIES</u>                  | SCIENTIFIC NAME               | OCCURRENCE<br>LIKELIHOOD |
|---------------------------------|-------------------------------|--------------------------|
| Masked Shrew                    | Sorex cinereus                | 1                        |
| Pygmy Shrew                     | Sorex hoyi                    | 1                        |
| Northern Short-tailed Shrew     | Blarina brevicauda            | 1                        |
| Least Shrew                     | Cryptotis parva               | 2                        |
| Arctic Shrew                    | Sorex arcticus                | 2                        |
| Eastern Mole                    | Scalopus aquaticus            | 1                        |
| Star-nosed Mole                 | Condylura cristata            | 2                        |
| Little Brown Myotis             | Myotis lucifugus              | 1                        |
| Northern Mytotis                | Myotis septentrionalis        | 2                        |
| Silver-haired Bat               | Lasionycteris noctivagans     | 1                        |
| Eastern Pipistrelle             | Pipistrellus subflavus        | 2                        |
| Big Brown Bat                   | Eptesicus fuscus              | 1                        |
| Red Bat                         | Lasiurus borealis             | 1                        |
| Hoary Bat                       | Lasiurus cinereus             | 1                        |
| *Eastern Cottontail             | Sylvilagus floridanus         | 1                        |
| Snowshoe Hare                   | Lepus americanus              | 2                        |
| *Least Chipmunk                 | Tamias minimus                | 2                        |
| *Eastern Chipmunk               | Tamias striatus               | 1                        |
| Woodchuck                       | Marmota monax                 | 1                        |
| Franklin's Ground Squirrel      | Spermophilus franklinii       | 3                        |
| *Thirteen-lined Ground Squirrel | Spermophilus tridecemlineatus | 1                        |
| *Gray Squirrel                  | Sciurus carolinensis          | 1                        |
| *Fox Squirrel                   | Sciurus niger                 | 1                        |
| *Red Squirrel                   | Tamiasciurus hudsonicus       | 1                        |
| Southern Flying Squirrel        | Glaucomys volans              | 1                        |

#### OCCURRENCE LIKELIHOOD:

- 1 = Very likely
- 2 = Likely
- 3 = Unlikely

(\* indicates species or sign observed)

| SPECIES                       | SCIENTIFIC NAME                | OCCURRENCE<br>LIKELIHOOD |
|-------------------------------|--------------------------------|--------------------------|
| Веачет                        | Castor canadensis              | 1                        |
| Western Harvest Mouse         | Reithrodontomys megalotis      | 2                        |
| *White-footed Mouse           | Peromyscus leucopus            | 1                        |
| Prairie Deer Mouse            | Peromyscus maniculatus bairdii | . 1                      |
| *Southern Red-backed Vole     | Clethrionomys gapperi          | 2                        |
| Prairie Vole                  | Microtus ochrogaster           | 2                        |
| *Meadow Vole                  | Microtus pennsylvanicus        | . 1                      |
| Woodland Vole                 | Microtus pinetorum             | 1                        |
| *Muskrat                      | Ondatra zibethicus             | 1                        |
| Southern Bog Lemming          | Synaptomys cooperi             | 1                        |
| *House Mouse                  | Mus musculus                   | 1                        |
| Norway Rat                    | Rattus norvegicus              | 1                        |
| Meadow Jumping Mouse          | Zapus hudsonius                | 1                        |
| Woodland lumping Mouse        | Napaeozapus insignia           | 2                        |
| *Porcupine                    | Erethizon dorsatum             | 2                        |
| Timber Wolf                   | Canis lupus                    | 2                        |
| *Coyote                       | Canis latrans                  | 1                        |
| *Red Fox                      | Vulpus vulpes                  | 1                        |
| Gray Fox                      | Urocyon cinereoargenteus       | 1                        |
| Black Bear                    | Ursus americanus               | 2                        |
| *Raccoon                      | Procyon rotor                  | 1                        |
| *Ermine (short-tailed Weasel) | Mustela erminea                | 1                        |
| Long-tailed Weasel            | Mustela frenata                | 1                        |
| Least Weasel                  | Mustela nivalis                | 1                        |
| Mink                          | Mustela vison                  | . 1                      |
| Badger                        | Taxidea taxus                  | 2                        |
| *Striped Skunk                | Mephitis mephitis              | 1                        |

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## MAMMALS POTENTIALLY OCCURRING ON THE PROPOSED EXPANSION AREA, HARDWOOD RANGE, AND VOLK FIELD (\* indicates species or sign observed)

| SPECIES            | SCIENTIFIC NAME        | OCCURRENCE<br><u>LIKELIHOOD</u> |
|--------------------|------------------------|---------------------------------|
| River Otter        | Lutra canadensis       | 2                               |
| Bobcat             | Felis rufus            | 2                               |
| *White-tailed Deer | Odocoileus virginianus | 1                               |
| Virginia Opossum   | Didelphis virginiana   | 1 .                             |

#### OCCURRENCE LIKELIHOOD:

- 1 = Very likely
- 2 = Likely
- 3 = Unlikely

#### APPENDIX B:

#### **VEGETATION SAMPLING METHODOLOGY**

#### APPENDIX B: VEGETATION SAMPLING

#### SURVEY METHODOLOGY

Vegetation habitats were initially delineated using aerial photographs, and delineations were refined during general field reconnaissance conducted in July 1996. As indicated in Table 3-6 (Section 3.4.1), sampling efforts were proportioned between the three areas examined, focusing first on the proposed expansion area (58 and 73 percent effort for canopy and herbaceous cover, respectively) followed by the Hardwood Range (25 and 18 percent), and then Volk Field (17 and 9 percent effort).

Sampling was also stratified proportionally among vegetation habitats. With the exception of Volk Field, the mixed deciduous woodland type received the greatest sampling effort because this vegetation habitat type dominated the landscape in all three areas examined. Dry oak woodlands at the proposed expansion area were not selected randomly due to the inability to distinguish this vegetation habitat using aerial photographs prior to field sampling. Field reconnaissance of dry oak woodland areas indicated that these sites tend to occur in small (< 1 acre), isolated pockets within the mixed deciduous woodland type. Locating these dry oak woodland sites in the expansion area became prohibitively time-consuming; therefore, no attempt was made to locate sites in Hardwood Range.

With the exception of dry oak woodland sites at the proposed expansion area, transects were randomly located using a random number table, and the approximate locations of both random and non-random sites were plotted on 7.5 minute topographic maps (Figures 3-10, 3-11a, 3-11b, and 3-12). Analysis of the dry oak woodland habitat type at the proposed expansion area required that sampling effort be weighted proportionally.

#### **Average Percent Canopy Cover**

Average percent canopy cover was determined using the methodology described by Canfield (1941), Oosting (1956), and Mueller-Dumbois and Ellenberg (1974). A randomly

located 50 meter long (~ 165 feet) straight line-transect was laid out in each vegetation type, and for each tree species exceeding 5 meters in height (~ 16.5 feet) (Mueller-Dumbois and Ellenberg, 1974), the intercepted parts of the canopy were projected vertically to the meter tape, and the length of recorded to the nearest tenth of a centimeter (~ 0.2 feet).

Calculations for each plant species (X) recorded were obtained using the following formula:

$$C_X = \sum_{I} I_X$$

where Cx = cover of X (%)

 $\sum I_x = sum of intercepts with X$ 

n =total number of samples taken within that habitat type

Results of the tabulated data are included Appendix C, and a sample of the field data collection sheet is included in Appendix D.

#### **Average Percent Herbaceous Cover**

Average percent herbaceous understory cover was determined using the methodology described by Daubenmire (1969). The bottom edge of a hoop measuring 1 meter square (~ 11 feet square) was placed at randomly located points along the left-side of the transect line, and each herbaceous species identified was classified according to a percent cover class. Cover classes were designated as follows: 0-5, 6-20, 21-40, 41-60, 61-80, 81-95, 96-100%.

Average percent cover was calculated by first tallying the median values for each species occurring within a habitat type, and then dividing that value by the total number of samples.

$$C_X = \sum_n M_d$$

where Cx = cover of X (%)

 $\sum M_d$  = sum of all median values of the species along the line-transect

n = total number of sample plots along the line-transect

Results of the tabulated data are included Appendix C, and a sample of the field data collection sheet is included in Appendix D.

#### **APPENDIX C:**

## SUMMARY TABLES: VEGETATION SAMPLING

# PERCENT COVER CANOPY AND PERCENT COVER HERBACEOUS UNDERSTORY

| Table C.1-1                 |                       |      |          |              | -    | $\vdash$     | H                 | L        | L                      |      |      |     | Г    |          |     | H            | H     | H    | H          | H        | L            |        |          |
|-----------------------------|-----------------------|------|----------|--------------|------|--------------|-------------------|----------|------------------------|------|------|-----|------|----------|-----|--------------|-------|------|------------|----------|--------------|--------|----------|
| WANG 1996 BIOLOGICAL SURVEY | URVEY                 |      |          |              |      | _            | _                 | _        | _                      |      |      |     |      |          |     | <del>-</del> |       |      | <b>_</b> _ | _        |              |        |          |
| CANOPY COVER DATA           |                       |      | П        |              |      | $\vdash$     |                   | Ц        |                        |      |      |     |      |          |     |              |       |      |            |          | <br>         |        |          |
|                             |                       |      |          |              | -    | _            | -                 | <u> </u> | _                      | _    |      |     |      |          |     |              | -     | -    | -          | 4        | -            | _      | i        |
| AREA:                       | EXPANSION AREA        |      |          |              | ŝ    | SAMPLES      | S                 |          |                        |      |      |     |      |          | -   |              |       |      |            | _        |              |        |          |
| HABITAT TYPE:               | MIXED DECIDIOUS       |      | <u> </u> |              |      |              |                   | _        |                        |      |      |     |      |          |     |              |       |      |            | H        |              | A<br>A | <u>ن</u> |
|                             |                       |      | -        | _            |      | <u> </u><br> | -                 |          |                        |      |      |     |      |          | _   |              |       |      | _          |          | T0T          |        | 띪        |
| Соштол Мате                 | Scientific Name       | -    | 7        | m            | -    | 9            | 1                 | •        | 6                      | 9    | =    | 2   | 2    | 74       | 15  | 16           | - 21  | 48   | 19 2       | 22       | 티            | ଧ      | :::1     |
| Jack Pine                   | Pinus banksiana       | -    |          |              | 1.7  | 9.           | <u> </u>          |          |                        |      | 27.9 |     |      | _        | -   |              | ļ     |      | 8.7        | 4        | -            |        | 4.7      |
|                             | Ulmus sp.             |      | 2.9      |              | !    | <u> </u>     | !                 | ļ.<br>-  | <u> </u>               |      |      | 1   | -    |          | 9.1 |              |       | _    |            | 0        | 7            | . ;    | 0.5      |
| Č                           | Ouercus so.           | 32.1 | 50.9     | 2.4 2        | 26.6 | 8.8          | 5.9 6.            | 6.3 26.5 | 5 14.9                 | 6.6  | 2.4  | 7   | 25.6 | 12.8     |     | 0.8          | 5.5   | 28.6 | 32         | 23       | _            |        | 7        |
| White Oak                   | Ouercus alba          | +    | -        | <del> </del> |      | <u>!</u>     | <u> </u> -        | <u> </u> |                        | Ľ    |      |     |      |          |     |              |       |      | _          | 3.5      | 3.5          |        | 0.4      |
| Vellow Birch                | Betula alloshaniensis |      | -        | -            | 2.6  | 3.2          | L                 |          | 1.5                    |      |      |     |      | r        |     |              |       | 1.8  | _          | <u> </u> | 9            | Ξ.     | 0.9      |
| Paner Rirch White Rirch     | Betula parvilera      | 6    | +        |              |      | _            | -                 | _        |                        |      |      |     | Γ    |          |     |              | -     | 4.8  |            | Ľ.       | 9            | 7.     | 0.7      |
| Alder Spectled Alder        | Almus ruensa          |      | -        | <del> </del> |      | _            | 5.8               | <u> </u> | L                      | 0.1  |      |     |      | <u> </u> | -   |              | -     | L    |            | _        | ,            |        | 0.7      |
| Amen Ousking Amen           | Permine tremuloides   | 20.1 | 20.3     | 24.1         | -    | 14.9         | 35.7 14.6         | 1.1      | 11 15.7                | 17.2 | 5.1  | 7.4 | 4    | 17.4     | 23  | 29.62        | 22.6  | 12.3 | -          | _        | 17 285       |        | 28.6     |
| Rietzoth Aenen              | Proules orandidentala |      | +        | -            | _    | -            | _                 | L        | L                      | 1.2  |      |     | 7.1  | 9.9      | ٢   | -            |       |      |            | ' '      | 7            | į      | . 5      |
| Chatecherry                 | Printe desiniona      |      | -        | -            | -    | -            | $\vdash$          |          | <u> </u>               |      | 0.7  |     |      |          | 2.5 |              | -     | -    | 5.5        | _        | <del>س</del> |        | 60       |
| Cherry Bleck Cherry         | Prums servina         |      | ╁        | 6.3          | -    | 1            | 2.4               | -        | _                      | 2.6  | 3    |     | 7    | 30.      | =:  | 12.8         | 2.3   | H    |            | Н        | 9 51         | ļ      | 5.2      |
| Manle Bed Manle             | Acer published        | 86   | 8.3      | 2.2          | 9.3  | 7.9 13       | 13.2 52.9         | 9 3.5    | 5 9.5                  | 3.4  | 4    | =   | 2    |          | -   | _            | 2.1 2 | 21.5 | 0.9        | E.       | 17 176.8     |        | 7.7      |
| A -                         | Element of            |      | +        | +            | -    | $\perp$      | -                 | L        | -                      |      |      |     |      |          |     | <u> </u>     | -     | _    | L          | -        | -            |        | 80       |
| ASE                         | Fraximus sp.          | 1    | 1        | -            |      | 1            | $\left\{ \right.$ |          | $\left  \cdot \right $ | -    |      | 1   | 1    | 1        |     | 1            | ١     | l    |            |          |              |        | l        |

| Table C.1-2           |                     |      |      |      |      |      | _             |       |             |
|-----------------------|---------------------|------|------|------|------|------|---------------|-------|-------------|
| WIANG 1996 BIOLOGICAL | SURVEY              | ,    |      |      |      |      |               |       | <del></del> |
| CANOPY COVER DATA     |                     |      |      |      |      |      |               |       |             |
|                       |                     |      |      |      | -    |      |               | ·     |             |
| AREA:                 | EXPANSION AREA      |      | SA   | MPL  | ËS   |      |               |       |             |
| HABITAT TYPE:         | DRY OAK WOODLAND    |      |      |      |      |      |               |       | AVG         |
|                       |                     |      |      |      |      |      |               | TOTAL | COVER       |
| Common Name           | Scientific Name     | 1    | 2    | 3    | 4    | 5    | N             | (m)   | (%)         |
| Red Pine              | Pinus resinosa      |      |      | 16.9 |      |      | <del></del> - | 16.9  | <u></u>     |
| Oak                   | Quercus sp.         | 30.3 | 26.1 | 19.8 | 33.5 | 36.8 | <del>- </del> | 146.5 | 58.6        |
| White Oak             | Quercus alba        | -    |      |      |      | 5.6  | 1             | 5.6   | 2.2         |
| Aspen, Quaking Aspen  | Populus tremuloides |      | 16.9 |      |      |      | <u> </u>      | 16.9  | 6.8         |

| Table C.1-3           |                                       |      |      |             |    |      | _    |      |      |      |      |     |                   |       |
|-----------------------|---------------------------------------|------|------|-------------|----|------|------|------|------|------|------|-----|-------------------|-------|
| WIANG 1996 BIOLOGICA  | L SURVEY                              |      |      |             |    |      |      |      |      |      |      |     |                   |       |
| CANOPY COVER DATA     |                                       |      |      |             |    | -    |      |      |      |      |      |     |                   |       |
| AREA:                 |                                       |      |      |             |    |      |      |      |      |      |      |     | <del>,,, ,,</del> |       |
|                       | EXPANSION AREA                        |      |      |             |    | SAM  | PLES |      |      |      |      |     |                   |       |
| HABITAT TYPE:         | PINE WOODLAND                         |      |      |             |    |      |      |      |      |      |      |     |                   | AVG.  |
|                       |                                       |      |      |             |    |      |      |      |      |      |      |     | TOTAL             | COVER |
| Common Name           | Scientific Name                       | 1 1  | 2    | 3           | 4  | 5    | 6    | 7    | 8    | 9    | 10   | N   | (m)               | (%)   |
| Red Pine              | Pinus resinosa                        | 12.2 | 44.7 | 29.7        | 47 | 29.6 | 15.5 | 38.4 | 29.9 | 22.7 | 36.5 | 10  | 306.2             | 61.2  |
| Jack Pine             | Pinus banksiana                       |      |      |             |    |      | 15.6 |      | -/./ |      | 30.5 | 10  | 15.6              |       |
| Oak                   | Quercus sp.                           | 4.1  |      |             |    |      | 7.6  |      | 19   | 23.6 | 12.7 | ÷   | 67                |       |
| Yellow Birch          | Betula allaghaniensis                 | -    |      |             |    |      | 7.0  | 3.4  |      | 23,0 | 14.7 |     |                   | 13.4  |
| Alder, Speckled Alder | Alnus rugosa                          |      |      | <del></del> |    |      |      | 5.2  |      |      |      | - ! | 3.4               |       |
| Aspen, Quaking Aspen  | Populus tremuloides                   | 5,7  |      | 2           |    |      | 33,2 | 2.4  |      |      |      |     | 5.2               | 1.04  |
| Maple, Red Maple      | Acer rubrum                           | 3.4  |      |             |    |      | 22,2 |      |      |      |      | - 5 | 40.9              |       |
| Unknown Tree          | inster suprates                       |      |      |             |    |      |      | 5.6  | 1.7  | 2.5  |      | 4   | 13.2              |       |
| CHICIONII 1165        | · · · · · · · · · · · · · · · · · · · | 7.8  |      | 1.1         |    |      |      |      |      |      |      | 2   | 8.9               | 1.70  |

| Table C.1-4           | 1               |               |    | ļ "  | 1  |          |   |       |              |
|-----------------------|-----------------|---------------|----|------|----|----------|---|-------|--------------|
| WIANG 1996 BIOLOGICAL | SURVEY          |               |    |      |    | 1        |   | 1     |              |
| CANOPY COVER DATA     |                 |               |    |      |    | [        |   |       |              |
| AREA:                 | EXPANSION AREA  | <del></del> - | SA | AMPL | ES | <u>!</u> | - |       | <del> </del> |
| HABITAT TYPE:         | DISTURBED AREAS |               |    | 1    |    |          |   |       | TOTAL        |
|                       |                 |               |    | 1    |    |          |   | TOTAL | COVER        |
| Common Name           | Scientific Name | 1             | 2  | 3    | 4  | 5        | N | (m)   | (%)          |
| Maple, Red Maple      | Acer rubrum     | 10.1          |    | !    |    | Ţ        | 1 | 10.1  | 4.           |

| Table C.1-5           |                       |      |      |      |      | ī    | ī    | i   |      |      | 1    |    |              |             |
|-----------------------|-----------------------|------|------|------|------|------|------|-----|------|------|------|----|--------------|-------------|
| WIANG 1996 BIOLOGICAL | SURVEY                |      |      |      |      |      | •    |     |      |      |      |    | <del>i</del> | <del></del> |
| CANOPY COVER DATA     |                       |      |      |      |      |      |      |     |      |      |      |    |              |             |
| AREA:                 | HARDWOOD RANGE        |      |      |      |      | SAM  | PLES |     |      | 1    | . į  |    | <del> </del> |             |
| HABITAT TYPE:         | MIXED DECIDUOUS       |      |      |      |      |      |      |     |      | -    | 1    |    | Ť            | AVG.        |
|                       |                       | 7    |      |      | ;    |      | İ    |     |      | i    |      |    | TOTAL        | COVER       |
| Common Name           | Scientific Name       | 1    | 2    | 3    | 4    | 5    | 6    | 7   | 8    | 9    | 10   | N  | (m)          | (%)         |
| White Pine            | Pinus strobus         |      |      |      |      | 7    |      |     |      |      |      | 1  | 7            | 1.4         |
| Jack Pine             | Pinus banksiana       |      |      | 7.9  |      |      | 17   | 5.7 | 15.9 | 6.5  | 3.1  | 6  | 56.1         | 11.2        |
| Oak                   | Quercus sp.           | 12.3 | 1.1  | 24.2 | 33.7 | 21.3 | 26.2 | 7.4 | 25.7 | 22.8 | 18.5 | 10 | 193.2        |             |
| Alder, Speckled Alder | Ainus rugosa          |      | 3.1  |      |      |      |      | -   |      |      |      | 1  | 3.1          |             |
| Aspen, Quaking Aspen  | Populus tremuloides   | 27.4 | 26.4 |      | 12.4 | 5.9  |      |     |      | 2.4  |      | 5  | 74.5         |             |
| Bigtooth Aspen        | Populus grandidentata |      | 2    |      |      | 1.4  |      | 4.4 |      |      |      | 3  | 7.8          |             |
| Cherry, Black Cherry  | Prunus serotina       |      | 1.2  |      |      | 3.6  | 1.5  | 4.8 |      |      | 3.1  | 5  | 14.2         |             |
| Maple, Red Maple      | Acer rubrum           | 5.1  |      | 2.1  | 11.6 |      |      |     |      | 5.6  |      | 5  | 33           | 1           |

| Table C.1-6          | !                     |      |      |      |      |      |   |          |          |
|----------------------|-----------------------|------|------|------|------|------|---|----------|----------|
| WIANG 1996 BIOLOGICA | L SURVEY              |      |      | 1    |      |      |   | 1        |          |
| CANOPY COVER DATA    |                       |      |      |      |      |      |   | <u> </u> |          |
| AREA:                | HARDWOOD RANGE        |      | SA   | MPLI | ES . |      |   |          | <u> </u> |
| HABITAT TYPE:        | PINE WOODLAND         |      |      |      |      |      |   | Ī        | AVG.     |
|                      |                       |      |      |      |      |      |   | TOTAL    | COVER    |
| Common Name          | Scientific Name       | 1    | 2    | 3    | 4    | - 5  | N | (m)      | (%)      |
| Red Pine             | Pinus resinosa        |      | 17.7 | 16.8 | 9.5  | 33.5 | 4 | 77.5     | 31.0     |
| Jack Pine            | Pinus banksiana       | 3.5  | 7.6  |      |      | 5    | 3 | 16.1     | 6.4      |
| Oak                  | Quercus sp.           | 1.4  | 0.1  |      |      |      | 2 | 1.5      | 0.6      |
| Yellow Birch         | Betuia allaghaniensis | 0.9  |      |      |      |      | 1 | 0.9      | 0.4      |
| Aspen, Quaking Aspen | Populus tremuloides   | 22.2 |      |      |      |      | 1 | 22.2     | 8.5      |
| Cherry, Black Cherry | Prunus serotina       | T    | 6.2  |      |      |      | 1 | 6.2      | 2.5      |
| Maple, Red Maple     | Acer rubrum           | 25.8 |      |      |      |      | 1 | 25.8     |          |

| Table C.1-7              |                     |      |      |      |      |             |   |              |       |
|--------------------------|---------------------|------|------|------|------|-------------|---|--------------|-------|
| WIANG 1996 BIOLOGICAL    | . SURVEY            |      |      |      |      |             |   | <del></del>  |       |
| CANOPY COVER DATA        |                     |      |      |      |      |             |   | <del>†</del> |       |
|                          |                     |      |      |      |      | <del></del> |   | 1 .          |       |
| AREA:                    | VOLK FIELD          |      |      | SA   | MPL  | ES          |   |              |       |
| HABITAT TYPE:            | MIXED DECIDUOUS     |      |      |      |      | <del></del> |   | 1            | AVG   |
|                          |                     |      |      |      |      |             |   | TOTAL        | COVER |
| Common Name              | Scientific Name     | 1    | 2    | 3    | 4    | 5           | N | (m)          | (%)   |
| Oak                      | Quercus sp.         | 3.1  | 23.2 |      |      |             | 2 | 26.3         |       |
| White Oak                | Quercus alba        | -    | 1    | 3.8  |      |             | 2 | . 4.8        |       |
| Paper Birch, White Birch | Betula papyrifera   | 1    |      |      | 6.4  |             | 1 | 6.4          |       |
| Alder, Speckled Alder    | Ainus rugosa        |      | -    |      | 1.4  | 12.7        | 2 | 14.1         |       |
| Aspen, Quaking Aspen     | Populus tremuloides | 4    | 4.4  | 4.8  |      |             | 3 | 13.2         |       |
| Willow                   | :Salix sp.          | 11.8 |      |      |      |             | 1 | 11.8         |       |
| Cherry, Black Cherry     | Prunus serotina     |      |      | 3.1  |      |             | 1 | 3.1          |       |
| Maple, Red Maple         | Acer rubrum         | 27.8 | 36.1 | 49.7 | 20.3 |             | 4 | 133.9        |       |
| Ash                      | Fraximus sp.        |      |      |      | 34.1 | -           | 1 | 34.1         | 13.64 |

| Table C.1-8           |                       |      |      |      |             | :   |   |       |       |
|-----------------------|-----------------------|------|------|------|-------------|-----|---|-------|-------|
| WIANG 1996 BIOLOGICAL | SURVEY                | 7 :  |      |      |             |     |   |       |       |
| CANOPY COVER DATA     |                       |      |      |      |             |     |   | !     |       |
|                       |                       | •    |      |      |             | :   |   | 1     |       |
| AREA:                 | VOLK FIELD            |      | SA   | MPLI | ES          |     |   | i     |       |
| HABITAT TYPE:         | DRY OAK WOODLAND      | i    | _    |      |             |     |   | ;     | AVG.  |
|                       |                       |      |      | -    |             |     |   | TOTAL | COVER |
| Common Name           | Scientific Name       | 1    | 2    | 3    | 4           | 5 . | N | (m)   | (%)   |
| White Pine            | Pinus strobus         | 13.9 | 0.1  |      | 11.3.       |     | 3 | 25.3  | 10.1  |
| Red Pine              | Pinus resinosa        | 1.2  |      |      | 9.5         | 5.3 | 3 | 16    | 6.4   |
| Jack Pine             | Pinus banksiana       |      | 3.2  | 13.9 | 8.6         | - 1 | 3 | 25.7  | 10.3  |
| Oak                   | Quercus sp.           | 27.9 | 32.7 | 22.8 | 16.2        | 43  | 5 | 142.6 | 57.0  |
| White Oak             | Quercus alba          |      | 8.1  | 7    |             |     | 2 | 15.1  | 6.0   |
| Bigtooth Aspen        | Populus grandidentata | ,    |      | 1.8  | :           | :   | 1 | 1.8   | 0.7   |
| Cherry, Black Cherry  | Prunus serotina       | 2    |      |      | · · · · · · | - : | 1 | 2     | 0.8   |
| Maple, Red Maple      | :Acer rubrum          | 5.7  |      |      | - :         |     | 1 | 5.7   | 2.3   |

| WIANG 1996 BIOLOGICAL SURVEY         |                         |              | i    |      | 1    | :    |               |          |
|--------------------------------------|-------------------------|--------------|------|------|------|------|---------------|----------|
| HERBACEOUS DATA COLLECTION           |                         |              |      |      |      |      | · <del></del> | <u> </u> |
| AREA:                                | EXPANSION AREA          |              |      |      |      |      |               |          |
| HABITAT TYPE:                        | MIXED DECIDUOUS         |              | 3/4  | MPL  | LS . |      |               |          |
| HABITAT TIPE.                        | MIXED DECIDOOS          |              |      |      |      |      |               | AVG.     |
| Common Name                          | Scientific Name         | 1            | 2    | 3    | 4    | 5    | N             | (%)      |
| Aspen, Trembling aspen               | Populus tremuloides     | į <b>0</b> , | 0    | 0.03 | 0    | 0    | 1             | 0.06     |
| Bare ground                          |                         | 1.18         | 0    | 0    | 0.1  | 0:   | 2             | 3.20     |
| Big Fern, Onoclea                    | Onoclea sensibilis      | 0            | 0.26 | 0    | 0    | 0.   | <del></del>   | 0.65     |
| Birch, Betula                        | Betula sp.              | 0            | 0    | 0    | 0.29 | 0    | 1             | 0.71     |
| Black cherry                         | Prunus serotina         | 0            | 0    | 0.03 | 0.39 | 0.08 | 3             | 1.23     |
| Cherry, Prunus                       | Prunus, sp.             | 0.08         | 0    | 0    | 0.03 | 0    | 2             | 0.25     |
| Chokecherry                          | Prunus virginiana       | 0.16         | 0    | 0    | 0    | 0    | 1             | 0.39     |
| Fragaria, strawberry                 | Fragari, sp.            | 0.31         | 0.05 | 0.13 | 0    | 0.16 | 4             | 1.61     |
| Frageria vesca, Wood Strawberry      | Fragaria vesca          | 0.59         | 0    | 0    | 0    | 0    | 1             | 1.46     |
| Galium, Bedstraw                     | Galium sp.              | 0            | 0.05 | 0.05 | 0.05 | 0.03 | 4             | 0.44     |
| Grass A, Unknown Grass A, Reedgrass  | Calamagrostis inexpansa | . 0          | 0    | 0    | 0.05 | 0.05 | 2             | 0.29     |
| Litter                               |                         | 3.58         | 0.65 | 2.49 | 6.28 | 3.34 | 5             | 40.84    |
| Maianthemum, Wild lily-of-the-valley | Maianthemum canadense   | 0.1          | 0    | . 0  | 0.03 | 0.08 | 3             | 0.50     |
| Moss B                               |                         | 0            | 0.03 | 0.18 | 0.29 | 0.03 | 4             | 1.29     |
| Moss, Moss A                         | ·                       | 0.39         | 0.18 | 0.16 | 0.15 | 0.1  | 5             | 2.44     |
| Oak, Quercus                         | Quercus sp.             | . 0          | 0.03 | 0.03 | 0    | 0.29 | 3             | 0.84     |
| Potentilla                           | Potentilla sp.          | 0            | 0.03 | 0.13 | 0.23 | 0.05 | 4             | 1.09     |
| Pteridium, Bracken fern              | Pteridium aquilinum     | 0.16         | 1.5  | 0    | 0.03 | 0    | 3             | 1 4.20   |
| Red maple, Maple                     | Acer rubrum .           | 0.52         | 1.13 | 0    | 0.15 | 0.05 | 4             | 4.6      |
| Red-osier dogwood                    | Cornus stolonifera      | . 0          | 0.13 | 0    | 0    | 0    | 1             | 0.3      |
| Rubus                                | Rubus, sp.              | 0            | 0    | 0.81 | 0.21 | 0.83 | 3             | 4.6      |
| Sedge B, Sedge-Wetland, Sedge        | Carex sp.               | 0            | 0.31 | 3.2  | 0.13 | 1.89 | 4             | 13.8     |
| Snowberry, Arctostaphylus, Bearberry | Arctostaphylus uva-ursi | 0            | 0.21 | . 0  | 0    | 0    | T             | 0.5      |
| Streptopis, Twisted stalk            | Streptopus roseus       | 0            | 0.38 | . 0  | 0    | 0    | 1             | 0.9      |
| Trientalis borealis, Starflower      | Trientalis borealis     | 0.08         | 0    | 0    | 0    | . 0  | 1             | 0.1      |
| Unknown forb, Unknown                | Unidentified forb       | : 0          | 0    | 0.05 | 0.05 | 0.03 | 3             | 0.3      |
| Vaccinium, Blueberry                 | Vaccinium sp.           | 0            | 0    | 0    | 0.03 | 0.16 | 2             | 0.4      |

| Table C.2-2                          | :                       |        | Ļ        |             |                |      |   |  |
|--------------------------------------|-------------------------|--------|----------|-------------|----------------|------|---|--|
| WIANG 1996 BIOLOGICAL SURVEY         | • •                     |        | <u>.</u> | · ·         |                |      |   | <del>:                                    </del> |
| HERBACEOUS DATA COLLECTION           |                         | -:     | i        |             |                |      |   | <del>:</del>                                     |
|                                      |                         |        | +        | 1           | <del>- i</del> |      |   |  |
| AREA:                                | EXPANSION AREA          |        | SAN      | <b>APLE</b> | S              | 1    |   |  |
| HABITAT TYPE:                        | DRY OAK WOODLAND        |        | - ;      |             |                | :    | • | AVG.   |
|                                      |                         | - ;    | - i      | ī           |                | 1    |   | COVER  |
| Common Name                          | Scientific Name         | : 1    | 2        | 3           | 4              | 5    | N | (%)  |
| Amelanchier, Serviceberry            | Amelanchier sp.         | 0.05   | 0        | 0           | 0              | 0;   | 1 | 0.13   |
| Aspen, Trembling aspen               | Populus tremuloides     | 0 0    |          | 0           | 0.             | 0    | 1 | 0.06   |
| Bare ground                          |                         | 0.18   | 0 (      | 0.39        | 0,             | 0    | 2 | 1.43   |
| Bigtooth Aspen                       | Populus grandidentata   | 0      | 0        | 0           | 0.03           | 0    | 1 | 0.06   |
| Birch, Betula                        | Betula sp.              | 0      | 0        | 0           | 0              | 2.48 | 1 | 6.20   |
| Black cherry                         | Prunus serotina         | i 0    | 0        | 0           | 0.36           | 0.13 | 2 | 1.21   |
| Cherry, Prunus                       | Prunus, sp.             | 0      | 0        | 0.08        | 0.03           | 0    | 2 | 0.25   |
| Chickweed, Wintergreen               | i <i>Gaultheria</i> sp. | 0.03   | 0        | 0:          | 80.0           | 0    | 2 | 0.25   |
| Chokecherry                          | Prunus virginiana       | 0.03   | 0        | 0.03        | 0              | 0    | 2 | 0.13   |
| Dogbane                              | Apocynum sp.            | 0      | 0        | 0.05        | 0              | 0    | 1 | 0.13   |
| Dogtooth Violet                      | Viola conspersa         | 0 (    | 0.03     | 0;          | 0;             | 0    | 1 | 0.06   |
| Fragaria, strawberry                 | Fragari, sp.            | 0.08   | 0.48     | 0           | 0.03           | 0.08 | 4 | 1.64   |
| Ginseng                              | Panax cinquefolium      | 0.05   | 0        | 0           | 0              | 0,   | 1 | 0.13   |
| Grass A, Unknown Grass A, Reedgrass  | Calamagrostis inexpansa | 0.99   | 0.16     | 0           | 0              | 0:   | 2 | 2.85   |
| Litter                               |                         | 0.34   | 1.68     | 0.13        | 1.13           | 3.13 | 5 | 15.98  |
| Maianthemum, Wild lily-of-the-valley | Maianthemum canadense   | 0.03   | 0.03     | 0           | 0.             | 0    | 2 | 0.13   |
| Marsh marigold                       | Caltha palustris        | 0;     | 0        | 0.03        | 0              | 0    | 1 | 0.06   |
| Moss, Moss A                         |                         | 0 0    | 0.03     | 0.59        | 0              | 0    | 2 | 1.53   |
| Oak, Quercus                         | Quercus sp.             | 0.21   | 0.16     | 0.05        | 0.08           | 0.6  | 5 | 2.71   |
| Pteridium, Bracken fern              | Pteridium aquilinum     | 2.82   | 0.18     | 1.64        | 0.42           | 0.18 | 5 | 13.08  |
| Red maple, Maple                     | Acer rubrum             | 0.03   | 0        | 0           | 0.05           | 0.03 | 3 | 0.25   |
| Red oak, Quercus rubra               | Quercus rubra           | 0      | 0        | 0           | 0              | 0.33 | 1 | 0.81   |
| Rice grass, Panic grass              | Panicum sp.             | 0.03   | 0        | 0           | 0              | 0    | 1 | 0.06   |
| Rubus                                | Rubus, sp.              | 0.05   | 0.39     | 0           | 0.03           | 0.03 | 4 | 1.23   |
| Rubus pabescens                      | Rubus pubescens         | 0.03   | 0;       | 0           | 0              | 0    | 1 | 0.06   |
| Sedge B, Sedge-Wetland, Sedge        | Carex sp.               | 0.16   | 0.89     | 1.41        | 2.92           | 1.7  | 5 | 17.69  |
| Smilancia, False Solomon's Seal      | Smilancia recemosa      | ! 0.03 | 0        | 0           | 0              | 0    | 1 | 0.06   |
| Snowberry, Arctostaphylus, Bearberry | Arctostaphylus uva-ursi | 0      | 0.13     | 0           |                | 0    | 1 | 0.33   |
| Solomon's seal                       | Polygonatum sp.         | 0.03   | 0        | 0           | 0              | 0    | 1 | 0.06   |
| Streptopis, Twisted stalk            | Streptopus roseus       | 0.03   | 0,       | 0.03        | 0              | 0.03 | 3 | 0.19   |
| Sweet Fern                           | Camptonia peregrina     | 0.03   | 0        | -           | 0.05           | 0    | 2 | 0.19   |
| Unknown forb, Unknown                | Unidentified forb       | 0.05   | 0.18     | 0.05        | 0.05           | 0.03 | 5 | 0.89   |
| Unknown grass                        | Graminae sp.            | 0.91   | 0        | 0           | . 0            | 0    | 1 | 2.26   |
| Unknown shrub                        | Unidentified shrub      | 0      | 0.05     | 0.03        | 0.7            | Ö    | 3 | 1.94   |
| Unknown tree                         | Unidentified tree       | 0      | 0.03     | 0           | 0              | 0    | 1 | 0.06   |
| Vaccinium, Blueberry                 | Vaccinium sp.           | : 0.61 | 0.29:    | 3.95        | 1.48           | 0.18 | 5 | . 16.26  |
| Yellow Flower, Bedstraw              | Galium sp.              | 0.18   | 0.       | 0           | 0.05           | 0    | 2 | 0.58   |

| Table C.2-3                          |                         |             |               |              |  |      |              | <del></del> |
|--------------------------------------|-------------------------|-------------|---------------|--------------|--|------|--------------|-------------|
| WIANG 1996 BIOLOGICAL SURVEY         |                         |             | <del></del> - |              |  |      |              |             |
| HERBACEOUS DATA COLLECTION           |                         |             | <del></del>   | 1            |  |      |              |             |
|                                      |                         |             |               |              |  |      |              |             |
| AREA:                                | EXPANSION AREA          | · · · · · · | SA            | MPLI         | ES   |      |              |             |
| HABITAT TYPE:                        | PINE WOODLAND           | 1 7         |               |              | -  |      |              | AVG.        |
|                                      |                         |             |               | <del>!</del> |  |      |              | COVER       |
| Common Name                          | Scientific Name         | 1           | 2             | 3            | 4  | 5    | N            | (%)         |
| Antennaria                           | Antennaria sp.          | + 0.03      | 0             | 0.18         | 0  | 0    | 2            | 0.51        |
| Aquilegia, Columbine                 | Aquilegia sp.           | 0.03        | 0             | 0            | Ő.   | 0    | 1            | 0.06        |
| Aspen, Trembling aspen               | Populus tremuloides     | 0.03        | 0.            | 0            | 0  | 0    | <del>-</del> | 0.06        |
| Aster                                | Aster sp                | 0           | 0             | 0.05         | 0  | 0.05 | 2            | 0.25        |
| Big Bluestem, Bluestem               | Andropogon, geraldi     | 0           | 0.03          | 0            | 0  | 0    | <u>-</u> -   | 0.06        |
| Black oak                            | Quercus velutina        | 0.05        | 0.08          | 0            |  | 0.13 | 3            | 0.63        |
| Fragaria virginiana. Wild strawberry | Fragaria virginiana     | . 0         | 0             | 0            | 0.   |      | 1            | 0.06        |
| Frageria vesca, Wood Strawberry      | Fragaria vesca          | . 0         | 0             | 0.           | 0  | 0.05 | Ť            | 0.13        |
| Grass A, Unknown Grass A, Reedgrass  | Calamagrostis inexpansa | 0.03        | 0             | 0            |  | 0    |              | 0.06        |
| Hazeinut                             | Corylus sp              | 0           | 0             | 0            |  |      | 1            | 0.06        |
| Нискіевету                           | Gaylussacia sp          | 0           | 0             | 0            | 0  | 0.88 | 1            | 2.20        |
| Jack pine                            | Pinus banksiana         | 0           | 0             | 2.72         | 0  |      | Ť            | 6.80        |
| Maianthemum, Wild lily-of-the-valley | Maianthemum canadense   | 2.7         | 5.48          |              | 7.84   | 3.84 | 5            | 55.85       |
| Marsh marigold                       | Caltha palustris        | 0.51        |               | 0.03         |  | 0.03 | 4            | 1.51        |
| Moss C                               |                         | 0.03        | 0.93          | 0.05         | 0.03   | 0.05 | 5            | 2.70        |
| Moss D, British Soldiers             |                         | 0.03        | 0             | 0            | 0  | 0.   | 1            | 0.06        |
| Moss, Moss A                         |                         | 0           | 0             | 0            | 0.1  | 0    | 1            | 0.25        |
| Mustard                              | Cruciferae              | 0.13        | 0.47          | 0.23         | 0.03   | 0.05 | 5            | 2.24        |
| Oxalis                               | Oxalis stricta          | 0.81        |               | 0            | 0.1  |      | 4            | 3.11        |
| Poison Ivy                           | Rhus fadicaus           | 0           | 0             | 0            | 0.05   | Ö    | ī            | 0.13        |
| Potentilla                           | Potentilla sp.          | 0.03        | 0.88          | 0            | 0  | 0    | 2            | 2.20        |
| Pteridium, Bracken fern              | Pteridium aquilinum     | 0           | 0             | 0            | 0  | 0.03 | 1            | 0.00        |
| Red maple, Maple                     | Acer rubrum             | 0.05        | 0.16          | 0.18         | 0  | 1.04 | 4            | 3.55        |
| Red oak, Quercus rubra               | Quercus rubra           | 0.16        | 0.03          | 0.03         | 0  | 0    | 3            | 0.5         |
| Red pine                             | Pinus resinosa          | 0.5         | 0             | 0            | 0  | . 0. | 1            | 1.25        |
| Rubus                                | Rubus, sp.              | 0           | 0             | 0            | 0  | 0.03 | 1            | 0.00        |
| Rubus pabescens                      | Rubus pubescens         | 0.65        | 0             | 0.26         | . 0  |      | 3            | 3.10        |
| Sedge B, Sedge-Wetland, Sedge        | Carex sp.               | 0.03        | 0             | 0.03         | 0  | 0    | 2            | 0.13        |
| Senecio, Groundsel                   | Senecio sp              | 0.1         | 0.08          | 0.08         | 0.03   | 1.41 | 5            | 4.20        |
| Smilancia, False Solomon's Seal      | Smilancia recemosa      | 0           | 0             | 0.03         | . 0  | 0.03 | 2            | 0.13        |
| Snowberry, Arctostaphylus, Bearberry | Arctostaphylus uva-ursi | 0           | 0             |              | <u>,                                      </u> |      | 0            | 0.00        |
| Solomon's seal                       | Polygonatum sp.         | 0.42        | 0.13          | . 0          | 0  | 0    | 2            | 1.30        |
| Speckled alder                       | Alnus rugosa            | 0           | 1             |              |  |      | -            | 0.00        |
| Sweet Fern                           | Camptonia peregrina     | 0           | 1 -           |              |  |      | 1            | 0.4         |
| Unknown grass                        | Graminae sp.            | 0.05        |               | _            | <u> </u>                                       |      | 3            | 0.5         |

| Table C.2-4                          |                         | :                          |       |
|--------------------------------------|-------------------------|----------------------------|-------|
| WIANG1996 BIOLOGICAL SURVEY          |                         | :                          |       |
| HERBACEOUS DATA COLLECTION           | <del> </del>            |                            | ·     |
| 719.1                                |                         |                            |       |
| AREA:                                | EXPANSION AREA          | SAMPLES                    |       |
| HABITAT TYPE:                        | DISTURBED AREAS         |                            | AVG.  |
|                                      |                         | <del></del>                | COVER |
| Common Name                          | Scientific Name         | 1 2 3 4 5 N                | (%)   |
| Antennaria                           | Antennaria sp.          | 0 0 0 0.05 0 1             | 0.13  |
| Aspen, Trembling aspen               | Populus tremuloides     | 0.39 0.34 0.81 0.61 0.16 5 | 5.74  |
| Bare ground                          | opmin ir critisoracy    | 0.05 0.05 0.03 0.34 0.05 5 | 1.28  |
| Birch, Betula                        | Betula sp.              | 0 0 0 0 0 0 0.13 1         | 0.33  |
| Black cherry                         | Prunus serotina         | 0.63 0 0.31 0.08 0.36 4    | 3.44  |
| Black oak                            | Ouercus velutina        | 0 0 0 0 0 0.13 1           | 0.33  |
| Carob                                | Caryophyllaceae sp      | 0 0 0 0 0 0                | 0.00  |
| Cherry, Prunus                       | Prunus, sp.             | 0 0 0 0 0.13 1             | 0.00  |
| Chickweed, Wintergreen               | Gaultheria sp.          | 0: 0.03: 0.05: 0: 0: 2     | 0.33  |
| Epilobium, Fireweed                  | Chamaenerion sp.        | 0 0 0 0 0 0 0              | 0.19  |
| Fragaria, strawberry                 | Fragari, sp.            | 0.26 0 0 0.18 0 2          | 1.10  |
| Goldenrod                            | Solidago sp.            | 0.03 0 0 0 0 1             | 0.06  |
| Grass                                | Gramineae sp            | 0 0 0 0.3 0 1              | 0.06  |
| Grass A, Unknown Grass A, Reedgrass  | Calamagrostis inexpansa | 0.03 0 0 0.21 0.63 3       | 2.15  |
| Lichens                              | Lichen                  | 0 0 0 0.03 0 1             | 0.06  |
| Litter                               | Lienen                  | 1.14 1.37 0.39 0.47 1.53 5 | 12.21 |
| Milkweed                             | Asclepias sp.           | 0 0 0 0.05 0 1             | 0.13  |
| Moss B                               | Thereprise sp.          | 0.16 0.03 0.18 0.08 0 4    | 1.09  |
| Moss C                               |                         | 0.13 0 0.03 0 0 0 2        | 0.39  |
| Moss D. British Soldiers             |                         | 0 0 0.05 0 0 1             | 0.33  |
| Moss, Moss A                         | -                       | 0.05 0 0 0.03 0 2          | 0.13  |
| Mustard                              | Cruciferae              | 0 0 0 0.03 0 1             | 0.19  |
| Oak, Quercus                         | Quercus sp.             | 1 0.05 0.03 0 0 3          | 2.69  |
| Potentilla                           | Potentilla sp.          | 0.03 0 0 0 0 1             | 0.06  |
| Pteridium, Bracken fern              | Pteridium aquilinum     | 0 5.27 1.75 0.21 0.57 4    | 19.49 |
| Red maple, Maple                     | Acer rubrum             | 0.59 0 0 0 0.39 2          | 2.44  |
| Red oak, Quercus rubra               | Quercus rubra           | 0 0 0.03 0 0.03 2          | 0.13  |
| Rice grass, Panic grass              | Panicum sp.             | 0.03 0 0 0 0 1             | 0.06  |
| Rose, Wood Rose                      | Rosa woodii             | 0  0.03 0.16 0.08 0 3      | 0.64  |
| Rubus                                | Rubus, sp.              | 0.88 0.1 0.05 0.49 2.19 5  | 9.26  |
| Rumex                                | Rumes sp.               | 0.03 0 0 0 0 1             | 0.06  |
| Sedge B, Sedge-Wetland, Sedge        | Carex sp.               | 1.55 1.29 0.73 0.62 0.61 5 | 11.99 |
| Snowberry, Arctostaphylus, Bearberry | Arctostaphylus uva-ursi | 0.03 0.13 0 0 0 2          |       |
| Solomon's seal                       | Polygonatum sp.         | 0 0 0.03 0 0 1             |       |
| Streptopis, Twisted stalk            | Streptopus roseus       | 0 0.03 0.05 0 0.05 3       | 0.31  |
| Sweet Fern                           | Camptonia peregrina     | 0 0 0.05 0.23 0 2          | 0.70  |
| Umbel                                | Umbelliferae sp.        | 0 0 0 0.03 0 1             | 0.06  |
| Unknown forb, Unknown                | Unidentified forb       | 0.13 0.03 0.08 0.16 0.05 5 | 1.08  |
| Unknown grass                        | Graminae sp.            | 0.73 0.03 0.08 0.16 0 4    | 2.45  |
| Unknown grass B, Little bluestem     | Andropogon scoparius    | 0 0 0 0.16 0 1             | 0.39  |
| Unknown grass C, Fescue              | Festuca sp.             | 0 0 0 0 0.03 0 1           | 0.06  |
| Unknown shrub                        | Unidentified shrub      | 0 0 0 0.18 0 1             |       |
| Vaccinium, Blueberry                 | Vaccinium sp.           | 0 0 1.48 0.39 0.31 3       | 5.41  |
| Veronica                             | Veronica sp.            | 0 0 0 0.05 0 1             | 0.13  |
| White Oak                            | Quercus alba            | 0 0 0 0 0 0.03 1           |       |
| Yellow Flower, Bedstraw              | Galium sp. x?           | 0 0 0.1 0.36 0 2           | 0.00  |

| Table C.2-5                          |                       |              |             |               |      |      |      |      |      |       |      |                  |               |
|--------------------------------------|-----------------------|--------------|-------------|---------------|------|------|------|------|------|-------|------|------------------|---------------|
| WIANG 1996 BIOLOGICAL SURVEY         |                       | <del> </del> |             | <del></del> - |      |      |      |      |      |       |      |                  | <del></del> - |
| HERBACEOUS DATA COLLECTION           |                       | -            |             |               |      |      |      |      |      |       | _    |                  | <del></del>   |
|                                      |                       | <del></del>  | <del></del> |               |      | :    |      | Ť    |      |       |      | <del></del>      |               |
| AREA:                                | HARDWOOD RANGE        | <del></del>  |             |               |      | SAMI | LES  |      |      |       |      |                  | <del></del>   |
| HABITAT TYPE:                        | MIXED DECIDUOUS       | ;            |             |               |      |      | :    |      |      |       |      |                  | AVG.          |
|                                      |                       |              |             |               |      |      |      |      |      |       |      |                  | COVER         |
| Common Name                          | Scientific Name       | 1            | 2           | 3             | 4    | 5    | 6    | 7    | 8 :  | 9     | 10   | N                | (%)           |
| Aspen, Trembling aspen               | Populus tremuloides   | 0.03         | 0           | 0.            | 0    | 0    | 0.03 | 0.03 | 0.13 | 0.03  | 0    | 5                | 1.2           |
| Aster                                | Aster sp              | 0.03         | 0           | 0.            | 0.   | 0    | 0    | 0    | 0    | 0.    | 0.   | _ <sub>ī</sub> _ | 0.1           |
| Big Fern, Onoclea                    | :Onoclea sensibilis   | 0            | 0.03        | 0:            | 0.   | 0    | 0    | 0    | 0    | 0:    | 0    | 1                | 0.1           |
| Cherry, Prunus                       | Prunus , sp.          | 0.16         | 0:          | 0.13          | 0.03 | 0    | 0    | 0:   | 0,   | 0.05  | 0.03 | 5                | 1.9           |
| Fragaria, strawberry                 | Fragari, sp.          | 0            | 0.          | 0             | 0    | 0    | 0    | 0    | 0.13 | 0.05  | 0.13 | 3                | 1.6           |
| Grass                                | Gramineae sp          | 0.03         | 0:          | 0             | 01   | 0.05 | 0.03 | 0    | 0    | 0:    | 0:   | 3                | 0.5           |
| Hazelnut                             | Corylus sp            | 0.           | 0:          | 0:            | 0:   | 0    | 0    | 0    | 0.03 | 0.    | 0:   | ī                | 0.1           |
| Impatiens, Jewelweed                 | Impatieus capensis    | 01           | 0.13        | 0             | 0    | Óī   | 0.   | 0    | 0    | 0.    | 0    | ī                | 0.7           |
| Litter                               | :                     | 1.01         | 1.58        | 1.2           | 0.63 | 1.18 | 0.43 | 0.13 | 0.43 | 0.63  | 0.43 | 10               | 38.3          |
| Maianthemum, Wild lily-of-the-valley | Maianthemum canadense | 0;           | 0           | 0.03          | 0    | 0.03 | 0    | 0    | 0.03 | 0.    | 0.03 | 4                | 0.5           |
| Moss B                               |                       | 0.5          | 0.          | 0             | 0    | 0    | 0    | 0    | 0    | 0:    | 0.03 | 2                | 2.6           |
| Moss, Moss A                         |                       | 0.           | 0;          | 0.03          | 0;   | 0.05 | 0    | 0    | 0.16 | 0.16  | 0.13 | 5                | 2.6           |
| Oak, Quercus                         | Quercus sp.           | . 0          | 0.          | 0.16          | 0:   | 0.03 | 0.05 | 01   | 0.13 | 0.05  | 0:   | 5                | 2.1           |
| Pteridium, Bracken fern              | Pteridium aquilinum   | 0.13         | 0.5         | 0.13          | 0.33 | 0.   | 0    | 0    | 1.2  | 0.13  | 0.43 | 7                | 14.2          |
| Red maple, Maple                     | Acer rubrum           | 0.13         | 0           | 0,            | 0.43 | 0.03 | 0    | 0    | 0    | 0.16  | 0.05 | 5                | 4.0           |
| Rubus                                | Rubus, sp.            | 0.16         | 0.          | 0.03:         | 0.43 | 0.16 | 0.26 | 0.16 | 0.03 | 0     | 0.03 | 8                | 6.2           |
| Sedge B, Sedge-Wetland, Sedge        | Carex sp.             | 0.05         | 0.16        | 0.13          | 0    | 0.05 | 0.05 | 0.88 | 0.05 | 0.03  | 0.   | 8                | 7.0           |
| Speckled alder                       | Alnus rugosa          | 0            | 0           | 0             | 0:   | 0.03 | 0    | 0.7  | 0.13 | 0     | 0    | 3                | 4.3           |
| Streptopis, Twisted stalk            | Streptopus roseus     | 0            | 0           | 0             | 0.03 | 0.03 | 0    | 0;   | 0:   | 0.03: | 0.16 | 4                | 1.2           |
| Unknown forb, Unknown                | Unidentified forb     | 0:           | 0           | 0:            | 0.   | 0    | 0    | 01   | 0    | 0,03  | 0.03 | 2                | 0.3           |
| Unknown grass                        | Graminae sp.          | 0            | 0           | , 0           | 0    | 0.03 | 0    | 0    | 0    | 0:    | 0:   | ī                | 0.1           |
| Vaccinium, Blueberry                 | Vaccinium sp.         | 0            | 0           | 0.16          | 0    | 0.43 | 0.6  | 0:   | 0.13 | 0.16  | 0.05 | 6                | 7.6           |
| Yellow Flower, Bedstraw              | Galium sp. x?         | 0.05         | 0           | 0.16          | 0;   | 0:   | 0.03 | 0    | 0.03 | 0     | 0.03 | 5                | 1.4           |

| Table C.2-6                   |                     | · · · · · · · · · · · · · · · · · · · |      |             |      |             |     |       |
|-------------------------------|---------------------|---------------------------------------|------|-------------|------|-------------|-----|-------|
| WIANG 1996 BIOLOGICAL SURVEY  | !                   |                                       |      | <del></del> |      | <del></del> | - : |       |
| HERBACEOUS DATA COLLECTION    |                     | · i                                   | :    |             |      | :           |     |       |
|                               |                     |                                       | i    | -           |      |             |     |       |
| AREA:                         | HARDWOOD RANGE      |                                       | SA   | MPLE        | S    |             |     |       |
| HABITAT TYPE:                 | PINE WOODLAND       |                                       |      | ;           |      |             |     | AVG.  |
|                               |                     |                                       |      |             | :    |             |     | COVER |
| Common Name                   | Scientific Name     | 1                                     | 2    | 3           | 4    | 5           | N   | (%)   |
| Aspen, Trembling aspen        | Populus tremuloides | 0.                                    | 0.03 | 01          | 0.03 | Ö.          | 2   | 0.5   |
| Big Fern, Onoclea             | Onoclea sensibilis  | 0.13                                  | 0    | 0           | . 0  | 0           |     | 1.3   |
| Fragaria, strawberry          | Fragari, sp.        | 0.13                                  | 0.   | 0:          | 0:   | 0           | 1   | 1.3   |
| Grass                         | Gramineae sp        | 0.03                                  | 0    | 0:          | 0    | <del></del> | 1.  | 0.3   |
| Litter                        |                     | 0.73                                  | 0.33 | 1.96        | 0.16 | 1.18        | 5   | 43.5  |
| Moss D, British Soldiers      |                     | 0.                                    | 0.03 | 0           | 0    | 01          | 1   | 0.3   |
| Moss, Moss A                  | ,                   | 0                                     | 0    | 0           | 0.03 | 0.03        | 2   | 0.5   |
| Oak, Quercus                  | Quercus sp.         | 0.03                                  | 0.05 |             | 0.03 | 01          | 3:  | 1.0   |
| Pteridium, Bracken fern       | Pteridium aquilinum | 0                                     | 0    | 0           | 0:   |             | 1   | 1.3   |
| Rubus                         | Rubus, sp.          | 0.131                                 | 0.03 | 0           | 01   | 0           | 2.  | 1.6   |
| Sedge B, Sedge-Wetland, Sedge | Carex sp.           | 0.16                                  |      | 0           |      |             | 4   | 44.0  |
| Vaccinium, Blueberry          | Vaccinium sp.       | 0.13                                  | 0    | 0           | 0:   | 0           | 1.  | 1.3   |
| Yellow Flower, Bedstraw       | Galium sp. x?       | 0.03                                  |      | 0           | 0    | 0           | 11  | 0.3   |

| Table C.2-7<br>WIANG 1996 BIOLOGICAL SURVEY  |                        | <u>_</u> | 4    |                |             |             | -  |             |
|--|------------------------|----------|------|----------------|-------------|-------------|----|-------------|
| HERBACEOUS DATA COLLECTION   |                        | <u> </u> |      |                | <del></del> | <u>'</u>    |    |             |
| HERBACEOUS DATA COLLECTION   | :                      | 1        |      | <del>!</del> - | <del></del> | <del></del> |    |             |
| AREA:  | HARDWOOD RANGE         |          | SA   | MPLE           | S           |             |    | <del></del> |
| HABITAT TYPE:  | DISTURBED AREAS        | ;        |      |                | -           |             |    | AVG.        |
| THOUSE THE STATE OF THE STATE O |                        |          |      | i              | <del></del> |             |    | COVER       |
| Common Name  | Scientific Name        | 1        | 2    | 3              | 4 :         | 5           | N  | (%)         |
| Aspen, Trembling aspen   | Populus tremuloides    | 0        | 0    | 0              | 0:          | 0.03        | 1  | 0.5         |
| Aster  | Aster sp               | 0.13     | 0:   | 0.             | 0:          | 0:          | 1  | 2.6         |
| Aster simplex  | Aster simplex          | 0        | 0.03 | 0.             | 0:          | 0:          | 1  | 0.5         |
| Astragalus, Unknown milk-vetch   | Astragalus sp          | 0        | 0.13 | 0              | 0           | 0.          | 1  | 2.6         |
| Bare ground  | 1                      | 0        | 0.03 | 0.63           | 0           | 0.16        | 3  | 16.2        |
| Big Bluestem, Bluestem   | Andropogon, geraldi    | 0.73     | 0.03 | 0.03           | 0           | 0           | 3  | 15.5        |
| Black oak  | Quercus velutina       | : 0      | 0    | 0              | 0.03        | 0           | 1  | 0.5         |
| Clover   | Trifolium sp           | 0.03     | 0    | 0              | 0           | 0           | 1  | 0.5         |
| Composite, Unknown composite   | Compositae sp          | . 0      | 0    |                | 0.16        | 0:          | 1  | 3.1         |
| Fragaria, strawberry   | Fragari, sp.           | 0.05     | 0    | 0.03           | 0.26        | 0.03        | 4  | 7.2         |
| Goldenrod  | Solidago sp.           | .0.16    | 0    | 0.03           | 0.05        | 0.03        | 4  | 5.1         |
| Grass  | Gramineae sp           | 0        | 0    | . 0            | 0.5         | 0           | 1  | 10.0        |
| Liatris, Blazing star  | Liatris sp             | 0        | 0    | 0.03           | 0:          | 0           | 1  | 0.5         |
| Litter   |                        | : 0      | 0.03 | 0              | 0.13        | 0.03        | 3  | 3.6         |
| Maximillian's sunflower  | Helianthus maximiliani | 0.3      | - :  | 0              | 0           | 0           | 1  | 6.0         |
| Moss D, British Soldiers   |                        | j O      | - ,  | 0.5            | 0i          | 0           | 1  | 10.0        |
| Moss, Moss A   |                        | . 0      |      |                | 0.03        | 0           | 2  | 1.0         |
| Potentilla   | Potentilla sp.         | 0.03     |      | 0              | 0           | 0           | 2  | 1.0         |
| Pteridium, Bracken fern  | Pteridium aquilinum    | 0.53     | 0.88 | 0.13           |             |             | 5  | 34.3        |
| Red maple, Maple   | Acer rubrum            | 0        |      |                |             |             | 1  | 2.6         |
| Rose, Wood Rose  | Rosa woodii            | 0.03     |      | •              | - 1         | 0           | 1  | 0.          |
| Rubus  | Rubus, sp.             | 0.05     |      | 0.03           |             |             | 5  | 18.2        |
| Sambucus, American Elderberry  | Sambucus canadensis    | : 0      |      |                |             |             | 1  | 17.6        |
| Sedge B, Sedge-Wetland, Sedge  | Carex sp.              | . 0      |      | 0.05           |             |             | 4  | : 21.       |
| Senecio, Groundsel   | Senecio sp             | 1 0      |      | 0              |             |             | 1. | 0.5         |
| Sweet Fern   | Camptonia peregrina    | 0        |      |                |             |             | 2  | 1.0         |
| Unknown forb, Unknown  | Unidentified forb      |          | 0.03 |                |             | ;           |    | : 2.0       |
| Unknown grass  | Graminae sp.           | . 0      |      |                |             | L           | 1  | 0.          |
| Unknown grass B, Little bluestem   | Andropogon scoparius   | . 0      | . •  |                | 0.13        | -           | 1  | 2.0         |
| Vaccinium, Blueberry   | Vaccinium sp.          | 0        |      | 0.13           |             |             | 4  | 4.          |
| Yellow Flower, Bedstraw  | Galium sp. x?          | 0.13     | 0.13 | 0              | 0.03        | 0           | 3  | 5.          |

| Table C.2-8                          |                       |                  |              |             |      |               |                |             |
|--------------------------------------|-----------------------|------------------|--------------|-------------|------|---------------|----------------|-------------|
| WIANG 1996 BIOLOGICAL SURVEY         |                       |                  |              |             |      |               |                |             |
| HERBACEOUS DATA COLLECTION           |                       | <del></del>      | · ·          |             |      | ·             |                | <del></del> |
|                                      | <u></u>               | <del>  </del> -  |              |             |      |               |                |             |
| AREA:                                | VOLK FIELD            | <del> </del>     | <u> </u>     | 2422        |      |               |                | <u></u>     |
| HABITAT TYPE:                        | MIXED DECIDUOUS       |                  | SA           | MPLI        | ES   | <del></del> , |                |             |
|                                      |                       |                  |              |             |      |               |                | AVG.        |
| Common Name                          | Scientific Name       | — <del>———</del> | 2            | 3           |      |               | <u> </u>       | COVER       |
| Ambrosia                             | Ambrosia sp           |                  | 0.03         | _           | 4    |               | _ <u>N</u>     | (%)         |
| Anemone                              | Anemone sp.           | <del></del>      | 0.03         | -           |      |               | 1              | 0.5         |
| Bare ground                          | sp.                   |                  |              | 0.03        |      |               |                | 0.5         |
| Big Bluestem, Bluestem               | Andropogon, geraldi   |                  | - :          |             | 0.13 |               | <u>l</u>       | 2.6         |
| Cherry, Prunus                       | Prunus, sp.           |                  | ·            |             |      | 0.98          | <u> </u>       | 19.6        |
| Grass                                | Gramineae sp          | <u> </u>         | 0.03         | 0.03        |      |               | 2              | 1.0         |
| Huckleberry                          | Gaylussacia sp        |                  |              | 0.13        | 0.13 |               | 2              | 5.2         |
| Litter                               | Gaylussacia sp        |                  | :            |             | 0.03 |               | 1              | 0.5         |
| Maianthemum, Wild lily-of-the-valley | 34 : 4                |                  | 0.13         | 0.03        |      |               | 3              | 9.1         |
| Mint                                 | Maianthemum canadense | 0.13             | i            |             | :    |               | 1              | 2.6         |
| Moss C                               | Meutha sp             | 0.03             | :            |             |      |               | 1              | 0.5         |
| Moss, Moss A                         |                       |                  |              |             | 0.03 |               | ī              | 0.5         |
| Poison Ivy                           |                       |                  | :            | 0.03        | 0.03 | :             | 2              | 1.0         |
| Potentilla                           | Rhus fadicaus         |                  |              | 0.03        |      |               | 1              | 0.5         |
| Pteridium, Bracken fern              | Potentilla sp.        | 0.03             | i            | 0.03        |      |               | 2              | 1.0         |
|                                      | Pteridium aquilinum   | 0.03             |              |             |      |               | 1              | 0.5         |
| Red maple, Maple<br>Rhubarb          | Acer rubrum           |                  | 0.03         |             |      |               | 1              | 0.5         |
| Rubus                                | Rheum sp.             |                  |              | <u>i</u>    | 0.03 | <del></del> - | <u> </u>       | . 0.5       |
| <del></del>                          | Rubus, sp.            | 0.03             | 0.03         | -           | 0.03 |               |                | 1.5         |
| Sagittaria, Arrowhead                | Sagittaria sp         | <u> </u>         | i            |             | 0.03 |               | <del>-</del> - | 0.5         |
| Sedge B, Sedge-Wetland, Sedge        | Carex sp.             | 0.13             | 0.88         | 0.3         | 0.13 |               | 4              | 28.8        |
| Spiraea                              | Spiraea sp            |                  |              | 0.03        | 3.13 |               | <del>-</del>   | 0.5         |
| Streptopis, Twisted stalk            | Streptopus roseus     |                  | +            | 0.03        | - !  |               | 1              | 0.5         |
| Thistle, Cirsium                     | Cirsium sp            |                  | - <u>·</u> · | 5.05        |      | 0.13          | <del>'</del>   | ·           |
| Unknown forb, Unknown                | Unidentified forb     |                  | 0.03         | <del></del> |      | 0.13:         | <u> </u>       | 2.0         |
| Vaccinium, Blueberry                 | Vaccinium sp.         | <del></del>      | 0.03         |             |      | <u>:</u>      | <u> </u>       | 0.5         |

| Table C.2-9                          |                       |                  |                |             |      |       |                |             |
|--------------------------------------|-----------------------|------------------|----------------|-------------|------|-------|----------------|-------------|
| WIANG 1996 BIOLOGICAL SURVEY         |                       |                  |                | -           |      |       |                |             |
| HERBACEOUS DATA COLLECTION           |                       |                  | :              |             |      |       |                | <del></del> |
| A                                    |                       |                  |                |             |      | -     |                | <del></del> |
| AREA:                                | VOLK FIELD            |                  | SAN            | 1PLI        | ES - |       |                |             |
| HABITAT TYPE:                        | DRY OAK WOODLAND      | :                |                |             |      | •     |                | AVG.        |
|                                      |                       | :                |                |             |      |       |                | COVER       |
| Common Name                          | Scientific Name       | 1                | 2              | 3           | 4    | 5     | N              | (%)         |
| Grass                                | Gramineae sp          | 0.13             |                | :           |      |       | 1              | 2.6         |
| Lichens                              | Lichen                |                  |                |             |      | 0.3   | ī              | - 6         |
| Litter                               |                       | 0.7              | 0.98           | 0.5         | 0.13 | 0.03: | 5              | 46.7        |
| Maianthemum, Wild lily-of-the-valley | Maianthemum canadense | 0.03             |                |             | 0.03 |       | 2              | 1           |
| Moss, Moss A                         |                       |                  | <del>- :</del> |             | 0.03 |       | ī              | 0.5         |
| Oak, Quercus                         | Quercus sp.           |                  | 0.03           | -1          |      |       | i              | 0.5         |
| Pine                                 | Pinus sp.             |                  |                |             | 0.03 | -7    | i              | 0.5         |
| Polythricum                          | Polythricum sp.       | 1                |                | -           | 0.03 | · · · | <del>-</del> - | 0.5         |
| Pteridium, Bracken fern              | Pteridium aquilinum   | :                | <del>- :</del> |             | 0.13 |       | i              | 2.6         |
| Rice grass, Panic grass              | Panicum sp.           |                  | <del>.</del>   |             |      | 0.03  | Ť              | 0.5         |
| Scrophulariaeceae                    | Scrophulariaceae sp.  | <del>- : -</del> |                | <del></del> |      | 0.7   | Ť              | 14          |
| Sedge B, Sedge-Wetland, Sedge        | Carex sp.             | 0.13             | 0.03           | 0.7         |      |       | -3             | 17.1        |
| Unknown tree                         |                       |                  |                |             |      | 0.03  | Ť              | 0.5         |
| Vaccinium, Blueberry                 | Vaccinium sp.         | 1                |                | 0.13        | 0.5  |       | <del>-</del> - | 12.6        |
| White Oak                            | Quercus alba          | 1 1              | :              |             |      | 0.13  |                | 2.6         |
| Yellow Flower, Bedstraw              | Galium sp.            | 1                | -              |             | 0.03 |       | ÷              | 0.5         |

| Table C.2-10                     |                      | 1           |      |       |      | -    |                | 1            |
|----------------------------------|----------------------|-------------|------|-------|------|------|----------------|--------------|
| WIANG 1996 BIOLOGICAL SURVEY     |                      | <del></del> |      |       |      | 1    |                | <del>+</del> |
| HERBACEOUS DATA COLLECTION       |                      |             |      |       |      |      |                | +            |
| AREA:                            | VOLK FIELD           |             | SA   | MPLI  | rs.  |      |                |              |
| HABITAT TYPE:                    | DISTURBED AREAS      |             |      | 1,122 |      |      |                | AVG.         |
|                                  |                      |             |      |       |      | . :  |                | COVER        |
| Common Name                      | Scientific Name      | 1           | 2    | 3     | 4    | 5    | N              | (%)          |
| Ambrosia                         | Ambrosia sp          |             |      | 0.4   | 0.4  | 0.6  | 3              | 28.0         |
| Bare ground                      |                      |             |      | 0.03  |      |      | 1              | 0.5          |
| Big Bluestem, Bluestem           | Andropogon, geraldi  |             | 0.5  |       | 0.98 | 0.88 | 3              | 47.2         |
| Clover                           | Trifolium sp         |             |      |       |      | 0.03 | 1              | 0.5          |
| Dogtooth Violet                  | Viola conspersa      |             | 0.03 |       |      |      | 1              | 0.5          |
| Goldenrod                        | Solidago sp.         |             | 0.13 |       |      | 0.13 | 2              | 5.2          |
| Litter                           |                      |             |      | 0.5   |      |      | ī              | 10.0         |
| Moss B                           |                      |             | -    | 0.03  |      |      | i              | 0.5          |
| Moss, Moss A                     |                      |             |      | 0.03  |      |      | i              | 0.5          |
| Nettle, Stinging nettle          | Urtica dioica        |             |      | 5.05  | 0.03 |      | 1              | 0.5          |
| Phleum, Timothy                  | Phleum pratense      |             |      |       | 0.02 | 0.03 | i              | 0.5          |
| Rose, Wood Rose                  | Rosa woodii          | 0.98        |      | -     |      | V.00 | <del></del>    | 19.6         |
| Sambucus, American Elderberry    | Sambucus canadensis  |             | 0.13 |       |      |      | ÷              | 2.6          |
| Sedge B, Sedge-Wetland, Sedge    | Carex sp.            |             |      | 0.3   |      |      | ÷              | 6.0          |
| Unknown forb, Unknown            | Unidentified forb    |             | _    | 0.03  |      | 0.03 | 2              | 1.0          |
| Unknown grass                    | Graminae sp.         |             |      |       |      | 0.03 | <del>-</del> - | 0.5          |
| Unknown grass B, Little bluestem | Andropogon scoparius |             |      | 0.13  |      | 0.03 | 2              | 3.1          |

# APPENDIX M BASH EVALUATIONS



Animal and Plant Health Inspection Service Animal Damage Control

National Wildlife Research Center Ohio Field Station 6100 Columbus Avenue Sandusky, Ohio 44870 (419) 625-0242 (419) 625-8465 fax

10 May 97

MEMORANDUM FOR ANG/CEVP

ATTENTION: Dick Masse

FROM: USAF BASH TEAM

HQ AFSA/SEFW

9700 AVE G SE, BLD 24499 KIRTLAND AFB, NM 87117-5671 USDA/APHIS/Animal Damage Control National Wildlife Research Center

6100 Columbus Ave. Sandusky, OH 44870-9701

SUBJ: Low-level Route Evaluations and BAM Graphs

- 1. Attached are the BAM graphs (Attachment 1) and low-level route evaluations (Attachment 2) that you requested. USAF BASH Team recommendations state these evaluations are good upon modification of route coordinates and should be reevaluated at that time. Funding for a new Bird Avoidance Model (BAM) is expected in 1997. This model will automate this labor intensive process and should make the PC-based BAM available to the field.
- 2. The purpose of these evaluations is to minimize the risk of a damaging bird strike. This is accomplished by making recommendations to pilots and route planners based on the relative severity of the bird strike hazard at a particular time of day, month and segment of a low-level route. Attachments 1 and 2 provide available bird strike history for routes, air bases, and/or MOA's evaluated.
- 3. Different bird species may be active at any hour of the day or night during any month of the year. We cannot eliminate the bird strike hazard, but we can significantly reduce it by flying at times and locations where birds are less concentrated.
- 4. For BAM graphs, routes are plotted indicating relative risk during dawn (± one hour of sunrise), midday (one hour after sunrise to one hour before sunset), dusk (± one hour of sunset) and night (one hour after sunset to one hour before sunrise). Units using the BAM have reported a significant reduction in bird strikes. Note: The BAM graph should only be used as a decision tool. The BAM graph averages hazards along entire routes and doesn't identify particular segments where the greatest hazard is present and gives no additional information on identified hazards.
- 5. The scale on the y-axis depicts the actual number of bird strikes expected over 1,000,000 nautical miles of the route for an aircraft with a frontal surface area of 100 square feet. Make note of the magnitude of these numbers when comparing different graphs (i.e. a route with an upper value of 200 on the y-axis is twice as hazardous as one with 100).
- 6. The BAM is based on population and distribution of North American waterfowl (geese, ducks and swans) and some species of raptors (birds of prey) which comprise approximately 60% of all damaging bird strikes. \*Gulls, pelicans, and other bird species are NOT included in this model. Raptor and waterfowl migration and concentration data is based on censuses conducted between 1981-85. Although the populations have changed, the relative comparisons are still valid. Updated graphs should be requested upon modification of route coordinates.



- 7. Bird strike hazards are broken down further from the graph to waterfowl and raptor strike potential (Attachment 2). Hazard codes for waterfowl strikes are broken down as follows: a Note represents 30-99 strikes/million nm flown, a Caution represents 100-999 strikes/million nm flown, and a Warning represents >1000 strikes/million nm flown. Hazard codes for raptor strikes are broken down as follows: a Note represents 3-9 strikes/million nm flown, a Caution represents 10-19 strikes/million nm flown, and a Warning represents >20 strikes/million nm flown.
- 8. Questions may be addressed to Maj Peter Windler, HQ AFSA/SEFW (BASH Team) at DSN 246-5674, commercial (505) 846-5674 or Mr Lovell, (419) 625-0242.

SIGNED FOR:

PETER R. WINDLER, MAJ, USAF Chief, USAF BASH Team

CHARLES D. LOVELL, GS-11

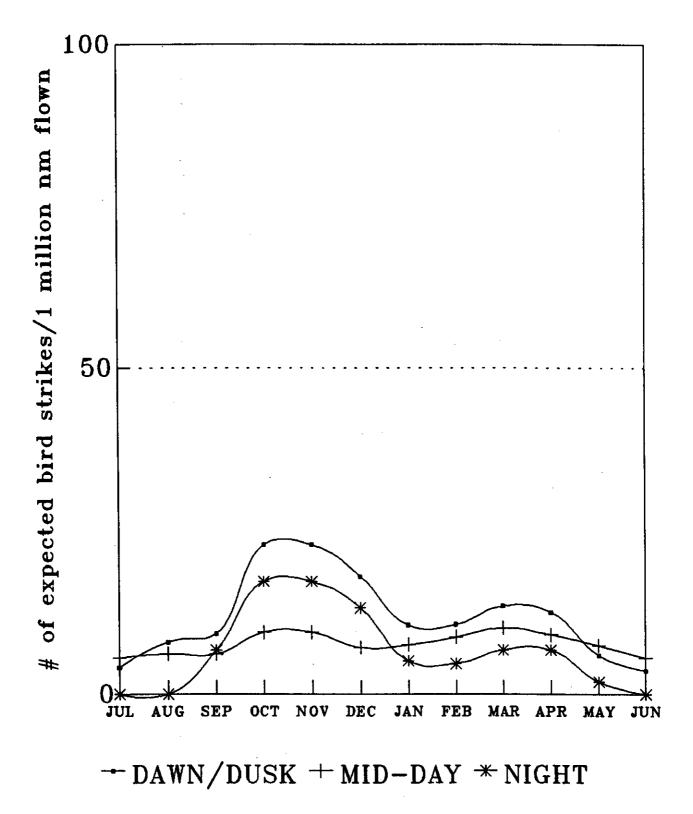
Wildlife Research Biologist

USDA/APHIS/Animal Damage Control National Wildlife Research Center

- 3 Attachments
- 1. BAM Graphs
- 2. Low-level Route Evaluations
- 3. Ouestionnaire

# VR - 1616

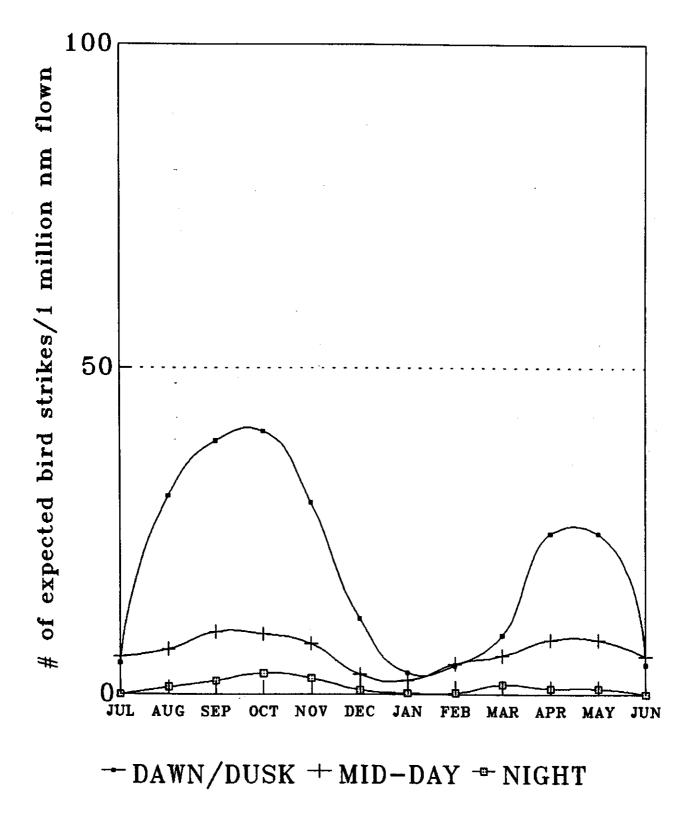
#### **Entire Route**



\*Data is averaged for entire route and may mask areas of concern M-3

# VR - 1650

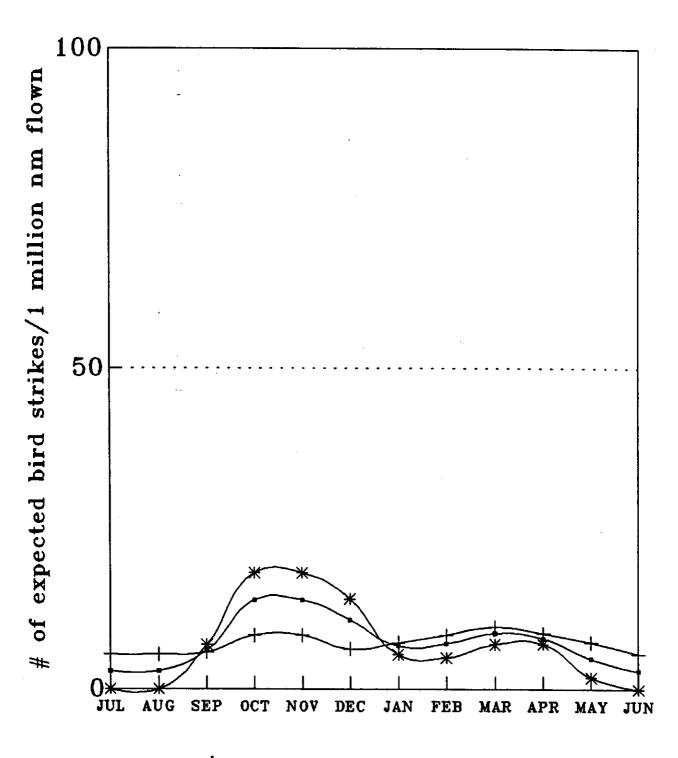
#### **Entire Route**



\*Data is averaged for entire route and may mask areas of concern

R - 6901

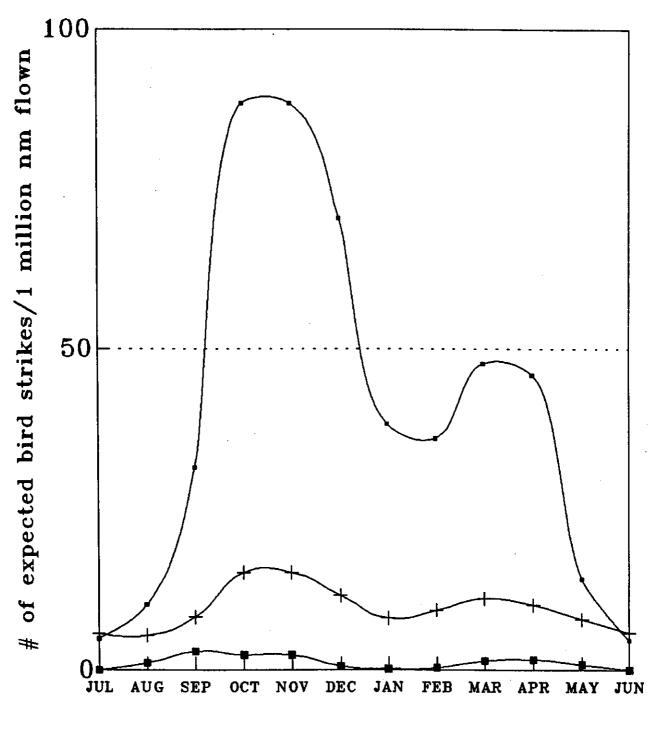
McCOY Entire Route



- DAWN/DUSK + MID-DAY \* NIGHT

500' AGL \*Data is averaged for entire route and may mask areas of concern M-5

# R-6904 HARDWOOD RANGE Entire Route



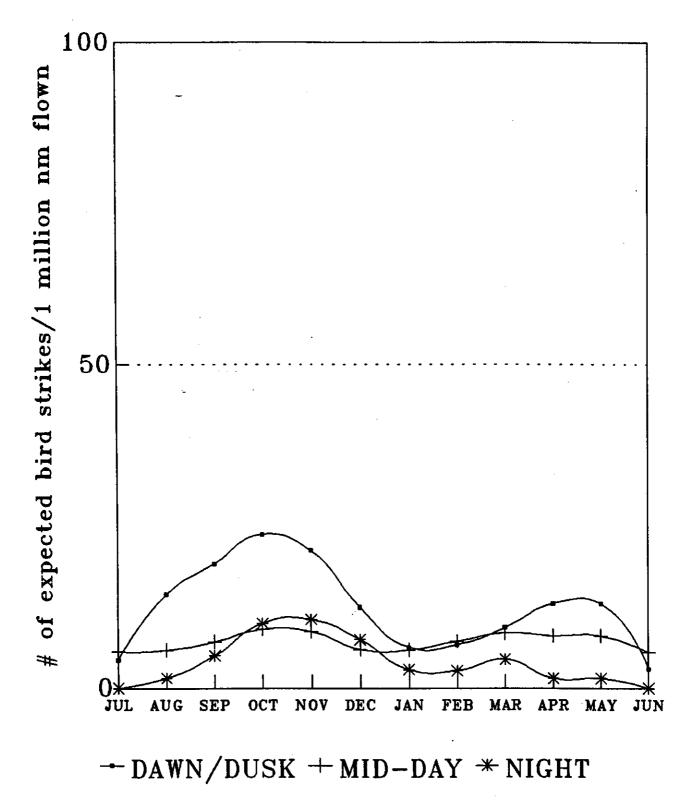
- DAWN/DUSK + MID-DAY - NIGHT

150' AGL
\*Data is averaged for entire route and may mask areas of concern

M-6

# FALLS 1&2

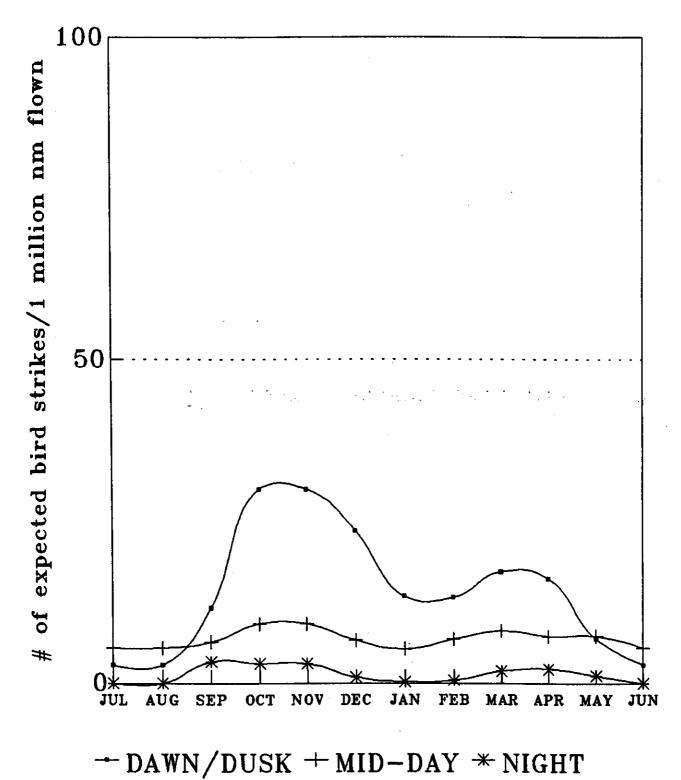
#### Entire Route



500' AGL \*Data is averaged for entire route and may mask areas of concern M-7

# VOLK SOUTH MOA

## **Entire Route**



500' AGL

\*Data is averaged for entire route and may mask areas of concern M-8

#### **LOW LEVEL ROUTE EVALUATIONS**

#### **VR ROUTES:**

#### **VR-1616**

Note: Soaring raptors prevalent SFC to 2000' AGL year-round for entire route during the mid-day time period.

Note: Waterfowl feeding flights SFC to 2000' AGL between points G-H during dawn/dusk time period from Oct-Dec.

Note: Waterfowl migratory flights SFC to 5000' AGL between points A-B during the night time period from Oct-Nov.

#### VR-1650

Note: Soaring raptors prevalent SFC to 2000' AGL for entire route during mid-day time period from Feb-Nov.

Note: Waterfowl feeding flights SFC to 2000' AGL between points B-D during dawn/dusk time periods from Apr-May and Aug-Nov.

<u>Caution</u>: High numbers of waterfowl feeding flights SFC to 2000' AGL between points B-C during the dawn/dusk time periods from Sep-Oct.

Recommendation: Avoid flying between points B-C during the dawn/dusk time periods from Sep-Oct.

#### **RESTRICTED AREAS:**

#### R-6901 - McCOY RANGE

Note: Soaring raptors SFC to 2000' AGL during the mid-day time period for entire route throughout the year.

Note: Soaring raptors SFC to 2000' AGL for entire area from Oct-Nov and Feb-May during the dawn/dusk time period.

#### R-6904 - HARDWOOD RANGE

Note: Soaring raptors SFC to 2000' AGL during the mid-day time period for entire area throughout the year.

Note: Waterfowl feeding flights SFC to 2000' AGL during the dawn/dusk time periods for the entire area from Oct-Apr.

#### MOA's:

#### FALLS 1/2 MOA

Note: Soaring raptors SFC to 2000' AGL during the mid-day time period for entire area throughout the year.

Note: Soaring raptors SFC to 2000' AGL for entire area from Sep-Nov and Feb-May during the dawn/dusk time period.

Note: Waterfowl feeding flights SFC to 2000' AGL in NW section of Falls 2 during dawn/dusk time period from Aug-Nov.

#### **VOLK SOUTH MOA**

Note: Soaring raptors SFC to 2000' AGL during the mid-day time period for entire area throughout the year.

Note: Soaring raptors SFC to 2000' AGL for entire area from Oct-Nov and Feb-May during the dawn/dusk time period.

# APPENDIX N AIR QUALITY MODELING

Pollutant : CO No. of Aircraft (Types) : 9 Avg. Period: 1-hour Mixing Height : 5000 ft.

| Aircraft   | Altitude<br>(ft) | Airspeed (mph) | Emiss. Rate<br>(lb/hr) | Flight<br>Freq. | 1-hour<br>Conc.<br>(micrograms/m**3) |
|------------|------------------|----------------|------------------------|-----------------|--------------------------------------|
| A10Y       | 500              | 405            | 18.70                  | 1               | .0526                                |
| F15X       | 500              | 550            | 18.14                  | 1               | .0376                                |
| B1BX       | 500              | 610            | 76.00                  | 1               | .1421                                |
| B52HX      | 500              | 400            | 14.35                  | 1               | .0409                                |
| C130H      | 500              | 240            | 4.88                   | 1               | .0232                                |
| F18        | 500              | 550            | 135.00                 | 1               | .2799                                |
| F-117X     | 500              | 600            | 18.10                  | 1               | .0344                                |
| F16X       | 500              | 550            | 9.29                   | 23              | .4430                                |
| <b>A</b> 6 | 500              | 520            | 40.46                  | 1               | .0887                                |

Total 1-hour conc. = 1.1424

The total 1-hour conc. is 2.86E-03 % of the PSD Class I 1-hour increment for CO (40000 micrograms/m\*\*3)

The total 1-hour conc. is 2.86E-03 % of the NAAQS Class I 1-hour increment for CO (4.00E+04 micrograms/m\*\*3)

Pollutant : CO No. of Aircraft (Types) : 9
Avg. Period: 8-hour Mixing Height : 5000 ft.

| Aircraft | Altitude<br>(ft) | Airspeed (mph) | Emiss. Rate (1b/hr) | Flight<br>Freq. | 8-hour<br>Conc.<br>(micrograms/m**3) |
|----------|------------------|----------------|---------------------|-----------------|--------------------------------------|
| A10Y     | 500              | 405            | 18.70               | 1               | .0022                                |
| F15X     | 500              | 550            | 18.14               | ī               | .0016                                |
| B1BX     | 500              | 610            | 76.00               | 1               | .0059                                |
| B52HX    | 500              | 400            | 14.35               | 1               | .0017                                |
| C130H    | 500              | 240            | 4.88                | 1               | .0010                                |
| F18      | 500              | 550            | 135.00              | 1               | .0115                                |
| F-117X   | 500              | 600            | 18.10               | 1               | .0014                                |
| F16X     | 500              | 550            | 9.29                | 43              | .0342                                |
| A6       | 500              | 520            | 40.46               | 1               | .0037                                |
|          |                  |                |                     |                 |                                      |

Total 8-hour conc. = .0630

The total 8-hour conc. is 6.30E-04 % of the PSD Class I 8-hour increment for CO (10000 micrograms/m\*\*3)

The total 8-hour conc. is 6.30E-04 % of the NAAQS Class I 8-hour increment for CO (1.00E+04 micrograms/m\*\*3)

Pollutant : NO2 No. of Aircraft (Types) : 9
Avg. Period: Annual Mixing Height : 5000 ft.

| Aircraft   | Altitude<br>(ft) | Airspeed (mph) | Emiss. Rate (lb/hr) | Flight<br>Freq. | Annual Conc. (micrograms/m**3) |
|------------|------------------|----------------|---------------------|-----------------|--------------------------------|
| A10Y       | 500              | 405            | 2.38                | 149             | 1.14E-05                       |
| F15X       | 500              | 550            | 442.64              | 204             | .0021                          |
| B1BX       | 500              | 610            | 23.00               | 134             | 6.58E-05                       |
| B52HX      | 500              | 400            | 53.04               | 133             | .0002                          |
| C130H      | 500              | 240            | 21.44               | 264             | .0003                          |
| F18        | 500              | 550            | 300.00              | 149             | .0011                          |
| F-117X     | 500              | 600            | 432.28              | 149             | .0014                          |
| F16X       | 500              | 550            | 278.64              | 1092            | .0072                          |
| <b>A</b> 6 | 500              | 520            | 37.60               | 148             | .0001                          |
|            |                  |                |                     |                 |                                |

Total annual conc. = .0125

The total annual conc. is .5018 % of the PSD Class I annual increment for NO2 ( 2 micrograms/m\*\*3)

The total annual conc. is .0125 % of the NAAQS Class I annual increment for NO2 (1.00E+02 micrograms/m\*\*3)

Pollutant : PART No. of Aircraft (Types) : 9
Avg. Period: 24-hour Mixing Height : 5000 ft.

| Aircraft | Altitude<br>(ft) | Airspeed (mph) | Emiss. Rate<br>(lb/hr) | Flight<br>Freq. | 24-hour<br>Conc.<br>(micrograms/m**3) |
|----------|------------------|----------------|------------------------|-----------------|---------------------------------------|
| A10Y     | 500              | 405            | 5.42                   | 1               | .0002                                 |
| F15X     | 500              | 550            | 8.37                   | 1               | .0002                                 |
| B1BX     | 500              | 610            | .20                    | 1               | 3.89E-06                              |
| B52HX    | 500              | 400            | 11.42                  | 1               | .0003                                 |
| C130H    | 500              | 240            | 1.01                   | 1               | 5.00E-05                              |
| F18      | 500              | 550            | 30.00                  | 1               | .0006                                 |
| F-117X   | 500              | 600            | 48.16                  | 1               | .0010                                 |
| F16X     | 500              | 550            | 3.51                   | 43              | .0033                                 |
| Aб       | 500              | 520            | 9.52                   | 1               | .0002                                 |
|          |                  |                |                        |                 |                                       |

Total 24-hour conc. = .0058

The total 24-hour conc. is .0726 % of the PSD Class I 24-hour increment for PART( 8 micrograms/m\*\*3)

The total 24-hour conc. is .0039 % of the NAAQS Class I 24-hour increment for PART(1.50E+02 micrograms/m\*\*3)

Pollutant : PART No. of Aircraft (Types) : 9
Avg. Period: Annual Mixing Height : 5000 ft.

| Aircraft   | Altitude<br>(ft) | Airspeed (mph) | Emiss. Rate (lb/hr) | Flight<br>Freq. | Annual<br>Conc.<br>(micrograms/m**3) |
|------------|------------------|----------------|---------------------|-----------------|--------------------------------------|
| A10Y       | 500              | 405            | 5.42                | 149             | 2.60E-05                             |
| F15X       | 500              | 550            | 8.37                | 204             | 4.04E-05                             |
| B1BX       | 500              | 610            | .20                 | 134             | 5.72E-07                             |
| B52HX      | 500              | 400            | 11.42               | 133             | 4.94E-05                             |
| C130H      | 500              | 240            | 1.01                | 264             | 1.45E-05                             |
| F18        | 500              | 550            | 30.00               | 149             | .0001                                |
| F-117X     | 500              | 600            | 48.16               | 149             | .0002                                |
| F16X       | 500              | 550            | 3.51                | 1092            | 9.07E-05                             |
| <b>A</b> 6 | 500              | 520            | 9.52                | 148             | 3.53E-05                             |
|            |                  |                |                     |                 | ~~~~~~~~~~~~~                        |

Total annual conc. = .0005

The total annual conc. is .0130 % of the PSD Class I annual increment for PART( 4 micrograms/m\*\*3)

The total annual conc. is .0010 % of the NAAQS Class I annual increment for PART(5.00E+01 micrograms/m\*\*3)

Pollutant : SO2 No. of Aircraft (Types) : 9
Avg. Period: 3-hour Mixing Height : 5000 ft.

| (ft)  | (mph)   | (lb/hr)  | Flight<br>Freq.                  | 3-hour<br>Conc.<br>(micrograms/m**3)                        |
|---|---|--|----------------------------------|---|
| A10Y 500<br>F15X 500<br>B1BX 500<br>B52HX 500<br>C130H 500<br>F18 500<br>F-117X 500<br>F16X 500 | 405<br>550<br>610<br>400<br>240<br>550<br>600 | 2.93<br>5.44<br>10.00<br>6.24<br>4.97<br>15.00<br>8.73<br>5.57 | 1<br>1<br>1<br>1<br>1<br>1<br>32 | .0014<br>.0019<br>.0031<br>.0030<br>.0039<br>.0052<br>.0028 |

Total 3-hour conc. = .0845

The total 3-hour conc. is .3382 % of the PSD Class I 3-hour increment for SO2 ( 25 micrograms/m\*\*3)

The total 3-hour conc. is .0065 % of the NAAQS Class I 3-hour increment for SO2 (1.30E+03 micrograms/m\*\*3)

Pollutant : SO2 No. of Aircraft (Types) : 9
Avg. Period: 24-hour Mixing Height : 5000 ft.

| Aircraft   | Altitude<br>(ft) | Airspeed (mph) | Emiss. Rate<br>(lb/hr) | Flight<br>Freq. | 24-hour<br>Conc.<br>(micrograms/m**3) |
|------------|------------------|----------------|------------------------|-----------------|---------------------------------------|
| A10Y       | 500              | 405            | 2.93                   | 1               | 8.59E-05                              |
| F15X       | 500              | 550            | 5.44                   | 1               | .0001                                 |
| B1BX       | 500              | 610            | 10.00                  | 1               | .0002                                 |
| B52HX      | 500              | 400            | 6.24                   | 1               | .0002                                 |
| C130H      | 500              | 240            | 4.97                   | 1               | .0002                                 |
| F18        | 500              | 550            | 15.00                  | 1               | .0003                                 |
| F-117X     | 500              | 600            | 8.73                   | 1               | .0002                                 |
| F16X       | 500              | 550            | 5.57                   | 43              | .0052                                 |
| <b>A</b> 6 | 500              | 520            | 4.76                   | 1               | .0001                                 |
|            |                  |                |                        |                 |                                       |

Total 24-hour conc. = .0066

The total 24-hour conc. is .1321 % of the PSD Class I 24-hour increment for SO2 ( 5 micrograms/m\*\*3)

The total 24-hour conc. is .0018 % of the NAAQS Class I 24-hour increment for SO2 (3.65E+02 micrograms/m\*\*3)

Pollutant : SO2 No. of Aircraft (Types) : 9
Avg. Period: Annual Mixing Height : 5000 ft.

| Aircraft | Altitude<br>(ft) | Airspeed (mph) | Emiss. Rate (lb/hr) | Flight<br>Freq. | Annual<br>Conc.<br>(micrograms/m**3) |
|----------|------------------|----------------|---------------------|-----------------|--------------------------------------|
| A10Y     | 500              | 405            | 2.93                | 149             | 1.40E-05                             |
| F15X     | 500              | 550            | 5.44                | 204             | 2.63E-05                             |
| B1BX     | 500              | 610            | 10.00               | 134             | 2.86E-05                             |
| B52HX    | 500              | 400            | 6.24                | 133             | 2.70E-05                             |
| C130H    | 500              | 240            | 4.97                | 264             | 7.12E-05                             |
| F18      | 500              | 550            | 15.00               | 149             | 5.29E-05                             |
| F-117X   | 500              | 600            | 8.73                | 149             | 2.82E-05                             |
| F16X     | 500              | 550            | 5.57                | 1092            | .0001                                |
| A6       | 500              | 520            | 4.76                | 148             | 1.76E-05                             |

Total annual conc. = .0004

The total annual conc. is .0205 % of the PSD Class I annual increment for SO2 ( 2 micrograms/m\*\*3)

The total annual conc. is .0005 % of the NAAQS Class I annual increment for SO2 (8.00E+01 micrograms/m\*\*3)

## **APPENDIX O**

# COORDINATION WITH NATIVE AMERICAN GROUPS

#### APPENDIX O

## COORDINATION WITH NATIVE AMERICAN GROUPS

The ANG has coordinated with the Ho-Chunk Nation and the Menominee Indian Tribe regarding traditional cultural resources and Native American concerns in a series of discussions, meetings, requests for meetings, and letters from 1996 through 1998. At a meeting in February 1998, the potential effects of ANG activities on traditional practices and settlement areas was discussed. The discussion also addressed resource identification and avoidance procedures, and archaeological inspection and protection within the proposed expansion area. Coordination is expected to continue at future meetings. A gap in the regular series of meetings occurred from June 1997 through January 1998 while tribal elections and reassignments took place. A chronological summary of coordination activities with Native American representatives includes the following.

- 8/19/96 ANG receives letter from Ho-Chunk Nation (C.A. Lowe, President) regarding effects of airspace use on cultural resources.
- 8/19/96 ANG receives letter from Ho-Chunk Nation Legislature (O.M. Garvin, Legislator) regarding VR-1616.
- 12/20/96 ANG meets at Volk Field with Ho-Chunk Nation members, Citizens Opposed to Range Expansion, and other groups
- 3/31/97 ANG letter to Ho-Chunk Nation (N.J. Kingsley, Director, Ho-Chunk Historic Preservation Department) addressing questions raised at meeting regarding airspace expansion and existing conditions.
- 5/2/97 ANG receives fax from Ho-Chunk Nation (O.M. Garvin, Legislator) referencing 5/1/97 teleconference with General Wilkening (Commander, WI ANG) addressing flights over cemetery.
- 5/13/97 ANG contacted by Ho-Chunk Nation (D. Makes Strong Move) to schedule meeting for 6/13/97 (phone call).
- 6/13/97 Meeting cancelled by Ho-Chunk Nation (per D. Makes Strong Move). To be rescheduled after 7/2/97 elections (phone call).
- 7/7/97 ANG inquires of Ho-Chunk Nation about rescheduling the meeting (phone call).
- 7/9/97 ANG requests meeting with Ho-Chunk Nation (R. Owens) in early August. No date set because of recent elections (phone call).
- 11/20/97 ANG receives letter from Ho-Chunk Nation Department of Justice (G.F. Brownell, Attorney General) with written comments on the DEIS.
- 12/18/97 ANG attempts to arrange meeting with Ho-Chunk Legislative Affairs Office (voice mail message).
- 1/12/98 ANG calls Ho-Chunk Nation (L. Garvin) to arrange meeting in February and Ho-Chunk Nation schedules meeting for 2/25/98.

- 2/25/98 ANG meets with Ho-Chunk legislators and legal counsel to discuss issues raised in the Nation's response to the DEIS.
- 2/26/98 ANG meets with representative of Menominee Tribe
   (D. Grignon, Director of Historic Preservation) to discuss range expansion proposal and the necessity for archaeological study.
- 7/27/99 ANG sends letter to Ho-Chunk Nation (J. Lonetree, President) requesting a meeting to further discuss ongoing issues.

Copies of correspondence and minutes from some of these meetings are displayed on the following pages. Due to the loss of some electronic computer files, ANG notes from some meetings were not available for this appendix. When available, meeting notes from other participating organizations have been included.



# HO-CHUNK NATION

#### OFFICE OF THE PRESIDENT

**MEMORANDUM** 

**AUGUST 19, 1996** 

TO:

**CAPTAIN DAVID OLSON** 

WISCONSIN AIR NATIONAL GUARD

P.O. BOX 8111

2400 WRIGHT STREET MADISON, WI 53708-8111

FROM:

PRESIDENT CHLORIS A. LOWE, JR.

RE:

HARDWOOD RANGE EXPANSION

This memorandum concerns Visual Route (VR) 1616 and Falls One and Two (MOA's). As a sovereign, the Ho-Chunk Nation continues to oppose the expansion of the Hardwood Range. As President of our Nation, I want to go on record stating that I object to any increased use of airspace over or near our sovereign lands.

Chloris De Jane

The following types of sites are considered sacred to Ho-Chunk people. As such, they are viewed as delicate in their environments and sensitive to the kinds of vibrations and noise disruptions caused by low-flying aircraft. This includes religious sites where ceremonies are held, sites where traditional medicines are harvested, and sites where pre-Columbian petroglyphs and pictographs are located.

In addition these areas include communities where our children and elders live. We simply do not want these types of high level noises interrupting our homes and backyards.

For these reasons, I object to the use and in particular, the expanded use of airspace on and near our traditional lands.

#### HO-CHUNK NATION LEGISLATURE



Governing Body of the Ho-Chunk Nation

August 19, 1996

Captain Dave Olson Wisconsin Air National Guard P. O. Box 8111 2400 Wright Street Madison, WI 53708-8111

#### Dear Captain Olson:

This letter is written to apprise of the Ho-Chunk Nations' continued concern for its tribal members, traditional religion, tribal lands and enterprises that are under VR 1616. The Air National Guard has published its intent to drop VR 1616 "from further study".

This route is directly over three of the tribes villages known as the Indian Mission, Sand Pillow in Jackson County and Chak-Hah-Chee in Wood County. We have residents who are subjected to loud jet noises and children who hit the dust when one of these trainee pilots decide to drop to less than 300 feet from the ground. Under this corridor we also have Headstart, Day Care and Elderly Centers. Four of our tribal enterprises are directly under VR 1616.

These flights disrupt the tranquility of our homeland in Wisconsin. The Air National Guard also needs to be aware of the fact that our traditional religious practices are being disrupted by the training in VR 1616.

On May 24, 1996, President William J. Clinton signed Executive Order #13007 regarding Indian Sacred Sites which states at Section I.

"Accommodation of Sacred Sites. (a) In managing Federal lands, each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

Captain Dave Olson Page 2 August 19, 1996

- "(b) For purposes of this order:
- (i) "Federal lands" means any lands or interests in land owned by the United States, except Indian trust lands;
- (ii) "Indian tribe" means an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to Public Law No. 103-454, 108 State. 4791, and "Indian" refers to a member of such an Indian tribe; and
- (iii) "Sacred site" means any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virture of its established religious significance to, or ceremonial use by, an Indian religion has informed the agency of the existence of such a site."

This is to inform you that our traditional leaders have such sites that are under VR 1616 and Air National Guard flights are a disruption to the ceremonies that are conducted There are other sacred sites under this corrdor. On October 17,1995 a letter was received from Lorraine S. Gross, Archaelogist, Science Applications International Corporation with the following: "We are requesting the assistance of the Ho-Chunk Nation in identifying your concerns regarding traditional cultural resources that might be potentially affected by the proposed action." (Proposed Hardwood Range Expansion and Related Airspace Actions.) No other contact has been made with me or our Historical Preservation Office since October 17, 1995. We pray that VR 1616 be considered for elimination as an ANG training route.

The Ho-Chunk Nation remains opposed to the expansion of Hardwood Range into Wood County as flights are intruding into airspace over our village and disruptive of tribal residents and concerns in that area.

The Native American Church also holds its activities in the outdoors and this causes great disruption throughout our communities in Jackson, Clark, and Wood Counties when these services are being held. Future consideration should be an elimination of VR 1616 and the entire proposed Expansion of Hardwood Range.

Sincerely

Ona M. Garvin, Legislator, Area IV.

#### THE WHITE HOUSE

#### Office of the Press Secretary

For Immediate Release

May 24, 1996

## EXECUTIVE ORDER #13007

#### INDIAN SACRED SITES

By the authority vested in me as President by the Constitution and the laws of the United States, in furtherance of Federal treaties, and in order to protect and preserve Indian religious practices, it is hereby ordered:

Section 1. Accommodation of Sacred Sites. (a) In managing Federal lands, each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

#### (b) For purposes of this order:

- (i) "Federal lands" means any land or interests in land owned by the United States, including leasehold interests held by the United States, except Indian trust lands;
- (ii) "Indian tribe" means an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to Public Law No. 103-454, 108 Stat. 4791, and "Indian" refers to a member of such an Indian tribe; and
- (iii) "Sacred site" means any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.
- Sec. 2. Procedures. (a) Each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall, as appropriate, promptly implement procedures for the purposes of carrying out the provisions of section 1 of this order, including, where practicable and appropriate, procedures to ensure reasonable notice is provided of proposed actions or land management policies that may restrict future access to or ceremonial use of, or adversely affect the physical integrity of, sacred sites. In all executive memorandum of April 29, 1994, "Government-to-Government Relations with Native American Tribal Governments."

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order, the head of each executive branch agency with statutory or administrative responsibility for the management of Federal lands shall report to the President, through the Assistant to the President for Domestic Policy, on the implementation of this order. Such reports shall address, among other things, (i) any changes necessary to accommodate access to and ceremonial use of Indian sacred sites; (ii) any changes necessary to avoid adversely affecting the physical integrity of Indian sacred sites; consultation with appropriate Indian tribes and religious leaders and the expeditious resolution of disputes relating to agency action on Federal lands that may adversely affect access to, ceremonial use of, or the physical integrity of sacred sites.

Sec. 3. Nothing in this order shall be construed to require a taking of vested property interests. Nor shall this order be construed to impair enforceable rights to use of Federal lands that have been granted to third parties through final agency action. For purposes of this order, "agency action" has the same meaning as in the Administrative Procedure Act (5 U.S.C. 551(13)).

Sec. 4. This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it, create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by any party against the United States, its agencies, officers, or any person.

WILLIAM J. CLINTON

THE WHITE HOUSE, May 24, 1996.

# # #

# C.O.R. E. Single of the Range o

## CITIZENS OPPOSED TO RANGE EXPANSION

916 Chak-Ha-Chee Lane, Nekoosa, WI 54457

December 20, 1996

Re: Meeting with Traditional Tribal Leaders of the Ho Chunk Nation, Citizens Opposed to Range Expansion representatives, Wisconsin Air National Guard officials, US Air Force officials, and representatives from: US Senator Russell Feingold, US Senator Herb Kohl, Governor Tommy Thompsen, US Representative Dave Obey, and US Representative Tom Petri.

This meeting today was arranged by Senator Feingold's office to facilitate an open discussion among the above groups. The Ho Chunk Nation and Citizens Opposed to Range Expansion are concerned about the proposed expansion of the Hardwood Bombing Range as well as the management of the current range. We feel that it is our duty as citizens to be the watchdog for any large projects that affect our community and state. We have come today with a list of questions and requests for a variety of documents that will help us get a clearer picture of what is actually going on at the range and what the proposed expansion entails. The meeting was scheduled here at Volk Field because all of the documents that we are requesting should be on sight.

Our concerns fall into several categories so we will organize our requests by category. In addition to these written questions members of our groups will be adding oral questions.

#### **RANGE SAFETY**

We understand from reading the military documents that have been available to us that in 1988 (when Hardwood Bombing Range was used primarily by sub sonic A10s and A4s) an exemption to AFR 50-46 was granted. We request the following documents:

- 1. The original application for this exemption.
- 2. A copy of the exemption that was granted including any restrictions placed on the range as a condition of granting the exemption.
- 3. Any subsequent applications for renewal of the exemption and the granted exemptions including any footprint information.

#### RANGE SAFETY CONTINUED

- 4. The incident file pertaining to any ordinance overshots from the range.
- 5. The range utilization log for the past year.

#### COMPREHENSIVE RANGE PLANNING

We understand from reading AFR 50-46, AFR 19-9, AFI 13-212, and AFI 32-7062 that all Air Force Bases and Ranges shall have on file and updated every two years a comprehensive range plan to "provide a commander with the information necessary to logically and thoroughly analyze a variety of factors before making a decision that affects the installation or the surrounding community. Comprehensive planning incorporates operational, environmental, urban planning and other Air Force programs, to identify and assess development alternatives and ensure compliance with applicable federal, state and local laws, regulation and policies." (AFI 32-7062 Chapter 2)

We request copies of the following:

- 1. The Comprehensive Range Plan for the Hardwood Bombing Range.
- 2. All environmental analysis reports done on water quality, air quality, toxic dumps sites and spills.
- 3. All Comprehensive Range Plan component plans that pertain to safety of civilians and environmental and wildlife issues.
- 4. Where are the range's emergency jettison areas located?
- 5. Why does the ANG need specialized ordinance disposal if there is no contamination from live bombs?
- 6. If only non explosive ordinances are used why is there scrapnell in the trees on the range?
- 7. The range decontamination reports.
- 8. A list of the noise avoidance areas for the Hardwood Bombing Range
- 9. A copy of the noise complaint form the citizens should be using.
- 10. A copy of the Wisconsin Air National Guard Master Plan.

- 11. A copy of the most recent Community Relations Plan for the Hardwood Bombing Range.
- 12. Detailed population maps of the area immediately surrounding the range.
- 13. What is the status of the clean-up of the F16 that crashed over a year ago outside Strom, WI? What happened to the hydrazine?
- 14. What is the status of the top ten toxic sites associated with Volk Field?
- 15. Was there ever a public affairs program developed in accordance with AFI 13-212? If so what were the times and dates of the meetings that were held? Was there ever a cohesive plan made?
- 16. Please provide copies of data provided to HQ for "Hazard Survey Analysis" and "Mitigation Analysis" as outlined in Vol III of AFI 13-212.
- 17. We would like a detailed map of the range.
- 18. It is our understanding that the US Air Force has a moratorium on new land acquisition. Where does the authority come from to proceed with this expansion proposal?
- 19. In the 1992 Environmental Analysis done for the conversion to F16s it talks about known archaeological sites at Volk Field. In this document on page ES-2 the ANG promises to do further study to protect this site. We would like to see this study.
- 20. On the same page of the above document mentions that the ANG has committed to further studies relating to the DNR Trumpeter Swan rearing program. We would like to see these studies.

#### USE OF AIRSPACE AROUND THE HARDWOOD BOMBING RANGE

In August of 1996 the Air National Guard Readiness Center at Andrew Air Force Base held a public information hearing to inform the citizens of Wisconsin that the ANG "noticed a discrepancy" between the number of flights they were authorized to fly in the Falls I and Falls II MOAs by the FAA and the number of flights they were actually flying. The discrepancy was a wooping 700%. The ANG is authorized to fly a total of 635 flights per year and they have been flying over 4400 flights per year.

1. Who has authority to monitor military flights and deal with non-compliance?

- 2. Once the ANG noticed the "discrepancy" why did they not cut back to the number of flights they were authorized to fly?
- 3. Doesn't this increase make the Environmental Analysis done on the MOAs invalid?
- 4. Please explain what the 1991 OARS is referring to on page 4 when it talks about safing armament switches.

#### **ALTERNATIVES**

Citizens Opposed to Range Expansion questions that all of the alternatives to expanding the Hardwood Bombing Range have been carefully considered. We have found discrepancies in the calculations in the OARS and DOPAAs that we have read. We would like to see the full research on the following:

- 1. The decision to install the ACMI unit here as opposed to Smokey Hill or elsewhere.
- 2. The decision to expand the current range as opposed to another range.

#### PIECEMEAL APPROACH

We believe that this expansion has been done in a piecemeal manner and would like to submit an opinion letter written to the DNR by Steve Zobbi, principal legal advisor for the Wisconsin Sierra Club to each of the members of this forum.

#### LEGALITY OF USING WISCONSIN COUNTY FORESTS FOR BOMBING RANGE

CORE has long questioned the legality of using County Forests for a bombing range and would like to take this opportunity to submit an opinion letter on the subject written by Bill Keppel of Dorsey and Whitney of Minneapolis. Mr. Keppel could not be here today but he continues to act as our pro bono legal counsel.

#### UPCOMING ENVIRONMENTAL IMPACT STATEMENT

In November of 1996 the WI ANG sent out an information sheet to some or all of its members trying to bias people in favor of the expansion. We question that such an action is appropriate since the EIS has not yet been completed. How do we even know if this is an environmentally viable plan? We also question using taxpayer money to lobby elected officials through form letter barraging. We would like to know the total number of people receiving that mailing, and the total cost of the mailing so that we can make inquiry into the ethics of such a practice.

- 1. What are the names and addresses of all contractors doing the research?
- 2. What specific contractor is doing the cultural resources assessment?
- 3. At the time that the various groups and individuals sent in their scoping period comments the expansion of the Neceedah Wildlife Refuge was not authorized. We request that consideration of this new federal program be researched in the EIS.

1. CAPTAIN DAVE OSON WI AM NAT. GURD (0) 608-242-3126 2. JEFF Wis WELL - PUBLIC AFFAIRS COUNSEL (F) x3136 TENNEY PLAZA, #616 MADISON, WIS. 608-258-8090 3 MAJOR CHUCK MELTON ANG/OPS, PLANS, + PROGRAMS (1)881-8274 (4/2) 963-3496 4. DONNA M. GOLLEKE C.OR.E MEMBER 5. Floyd A Honenstein - Property Owner in Proposal 715-886-3515 Exp. Area. Core Member 6 Cliff winker (Cone) 608. 565 2769 N14002-13# mu Necedah, W: 54646 7 DICK MASSE NATI GUARD BUTEAU WK 301-836-886Z 8. Dick Smith Ry Sparta 54656 CORE 9 GEORGE ALDRICH - US SEW RUSS FEINGOLD'S OFFICE 19 Steve Piatrowski US Sen. Heals Kohl's office 11. BE-T FUNMAKER TRATH COURT Elder Horah
608 372-5084 12, Levin Marek ANGRO/CEUP 301-836-8855 ANDROWS AFB MD 20351 73. Dobra Schwarze schwarze
P.O. Box 525 Richland Center WI 53581

14. Charlotte O'Brien 15 923 1646 St. S

CORE coordinator

15 923 1646 St. S La Crosse, WI 54601 16) BILL BUCKLEY 1004 5 CHERRY AYE, MARSHETELD

54449 - 715 - 384-2214

PRESIDENT: WIS. WILDLIFE FED

COUNCILOR - " CONSERVATION CON CRESS

17. Daviel Golueke 7095 Linosey Ro. MARSHFIELD. Lur.
54449

Land Owner Town of Cary.
Menser OF CO.R.E

18 J.m GINTER W7567 2005T. NECEDAH WI MEMBER: CO. R.E. BOMBING RANGE AREA LANDOWHOR

19. Many Brazeau Brown 2466 County Ha D. Wiskaga Cundowner 6000 A Town of Cramoon Stige

20. Ona M. Harvin, 3706 Hay X, Otherelle WI 54466 40 Church Natur Lyislahu, P.1.667, Black Rum Bell 54615

21 Cliff Winker - N 14002 - 13 Man Necetity wi. 608 565. 2769 - KAND OWNER - Monter Code.

22 Maj Tury Mc Audle - HO Wis. National GUARD, 2400 Wight St., NADISON, WI 53709 - (608) 242-5077

23 LTC LARRY M. YOUNG - VOIK CRTC/DO (608) 427-6201 CAMP Douglas, WI 54618



25. WILLIAM S. REID; GOVERNOR TOMMY THOMPSON

26. Don Garmer-Gerhardt, Congressman Dave Obey

27. DAVID Beck

VOURFIELD

78. L+Col Kent Alams
Perject Manager.
Harlwood Range FIS

National freshed Bureau ANGRC/CENT 3500 Fetchet Avenue ANDROWS AFB MD 20762-5757



# VOLK FIELD COMBAT READINESS TRAINING CENTER WISCONSIN AIR NATIONAL GUARD CAMP DOUGLAS, WI

3 Mar 97

David A. Beck, Captain, WIANG Environmental Manager CRTC Volk Field 100 Independence Drive Camp Douglas, WI 54618

Ms. Nettie J. Kingsley
Director, Ho-Chunk Historic Preservation Dept.
P.O. Box 667
Black River Falls, WI 54615

Dear Ms. Kingsley

On behalf of LtCol Gunther Neumann, Mr. Dick Masse, and myself, I would like to express our sincere thanks to you and your staff for meeting with us last Friday. I'm hoping that you believe, as we do, that the meeting was both useful and productive. Also, we're hoping that the meeting was able to help clarify issues relative to the Hardwood Range Proposal and how the proposal might affect the Ho-Chunk Nation and its cultural and religious heritage. We were pleased to hear, that with the elimination of the Military Training Routes from the proposal, that there did not appear to be any known areas with mound systems or areas of rock art which would be affected. We will need to rely on your expertise and assistance to help ensure that any potential sites are identified and protected. Any additional information that you could provide (i.e. the village near Babcock that we discussed) would be helpful. With your permission, we would like to continue meeting on a regular basis. Thank you also for the informational brochures. I've read them all and found them to be very informative.

I'm writing this letter also to let you know that we have been collecting our archeological documents and other information for mailing to you. As promised, Dick Masse will be checking to see if any Native American foods, herbal's, medicinal's, or the Wkiti Maisu have been identified or considered in the Biological Survey. As additional information becomes available we will send it to you. We have added you to our mailing list for Hardwood Range Environmental Impact Statement information and, as you requested, arrangements for an overflight of the Hardwood Range and the proposed expansion area is being arranged for you and your staff. I believe that we can provide a helicopter flight for you at a time which would be both convenient and beneficial to seeing the area. In the past we have found that a flight over the area can help answer a number of questions. A demonstration, by Bill Kingswan, of your Ground Penetrating Radar would also be interesting.

The last item that I wanted to mention is the delicate issue of existing sacred sites and if you will be able to assist us in identifying areas in which they are located. We understand that this may not be possible, since these locations have great religious significance. I think that perhaps in future meetings we may be able to work on ways to avoid sacred sites and ceremonies, as appropriate.

Once again, thank you for the time that you and your staff shared with us. We look forward to seeing and working with you all again very soon.

Sincerely

DAVID A. BECK, CAPT, WIANG

Environmental Manager

CC:

State Historical Preservation Office MG Berard BG Wilkening CRTC/CC, DO, OT Mr. Masse

phone Representina NAme (608) 427-1441 VOLK FIELD PT DAVID Beck VULK FIELD c Conther Newmann (608) 427-1530 (30) 86 2 800 NAT GUARD BELVERU R. DICK MASSE www Makes Strong Move, Anthropologist. 6000-561-9918 HoChunk Historic Preservation BARRY BLACKhawk-Hockwar Meting Museum Dis 715-284-7181 HCHP-GPR OPGRATOR Illiam Klugswan 284-9343 800 561-9918 ranne K Owens, HISTORIAN HO CHUNK HISTORIC PRESERVATION DEPT. PO BOX 667 BKF 54615

800-561-9918

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WISHELL GROUP

Tenney Plaza, Suite 616, Three South Pinckney Street Madison, Wisconsin, 53703-2866 Talaphone: (0) 608-258-8090 (E) 508-222-1000

(Fax) 608-257-1263

Consultants in Governmental and Public Affairs

### MEMORANDUM - FAX

TO:

Brig. General Albert Wilkening,

Deputy Adjutant General for Air-Wisconsin (608) 242-3111

FROM:

Jeff Wiswell, Public Affairs Counsel

Ho-Chunk Nation

DATE:

May 2, 1997

RE :

BLACK RIVER FAILS/HO-CHUNK NATION FOLLOW UP:

Thank you for taking time yesterday to visit with Ho-Chunk Mation Legislative Representative Ona Garvin and I by talephone regarding reoccurring low level flights in the Black River Falls.

These flights have taken place in the area directly over the nation's headquarters to a point over the John Pettibone residence which is just north of the Mission cemetery. You will recall we visited the cemetery last January during your visit to the area. This is the cemetery where congressional medal of honor winner Mitchall Red Cloud is "at rest".

The flights are very frightening to the young and elders alike. Further, they are very disruptive and provocative to the nation's business and annoying to the general state of commerce.

I appreciate your willingness to follow up on this and your support for General Slack's idea to have local guard personnel and area to Chunks actually get out into the field to determine Again we would be happy to travel by van or by coordinates. helicopter.

Please feel free to give me a call, or you may wish to reach Mrs. Garvin at the Executive Office. The address there is P.O. Box 667, Black River Falls, Wisconsin, 54615. The telephone number is 800-294-9343.

Thank you.

### JLW: TAW:

CC: Ona Garvin, Legislator, Ro-Chunk Mation (715) 284-3172 Tracy Thundercloud, Legislator, Ho-Chunk Nation

OPTIONAL FORM 95 (7-90)

| .c. | LTC Young       |  |
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# Ho-Chunk Nation Department of Justice

P.O. Box 667 & Black River Falls, WI 54615 & Phone (715) 284-3170
FAX (715) 284-7851

Cary F. Brownell, Attorney General Tribal Attorneys:
Sheila D. Corbine Colleen M. Baird M.
Michael P. Murphy Todd R. Matha William A. Boulware, Jr. M.
Kari L. Kilday, Paralegal

November 20, 1997

Program Manager, Hardwood EIS Environmental Division Air National Guard CEVP 3500 Fetchet Avenue Andrews AFB, MD 20762-5157

RE: Draft Environmental Impact Statement

Dear Sir:

I am providing herewith a copy of the Memorandum of Comments on the Draft Environmental Impact Statement [DEIS] for Hardwood Range Air-to-Surface Gunnery Range Expansion and Associated Airspace Actions prepared by the Ho-Chunk Nation Department of Justice.

Please address any communications on this matter to me or William Boulware, Jr.

Sincerely,

Gary F. Brownell Attorney General

enc.

cc: Jacob Lone Tree, President of the Ho-Chunk Nation

William F. Gardner, Legislative Attorney

Jeff DeCora, Legislative Counsel

# **MEMO**

To:

U.S. Air National Guard

From:

William A. Boulware, Jr., HCN Department of Justice WAB/AFD

Subject:

Comments on the Air National Guard Draft Environmental Impact Statement

Date:

November 20, 1997 (8:57am)

cc:

G. Brownell, Attorney General
J. Rockman, Office of the President
Jeff Decora, Legislative Counsel

Mary Frances Repko, Legislative Assistant to Sen. Feingold

William F. Gardner, Legislative Attorney

file a:\deis.wpd

The following comments are intended for:

Program Manager, Hardwood EIS Environmental Division Air National Guard CEVP 3500 Fetchet Avenue

Andrews AFB, MD 20762-5157

This Memorandum provides the initial comments of the Ho-Chunk Nation [Nation] on the Draft Environmental Impact Statement [DEIS] of the Air National Guard on the environmental consequences associated with the proposed action to expand the Hardwood Air-to-Surface Gunnery Range (land expansion of 7,137 acres) and Associated Airspace Actions. The expansion of the existing Hardwood Range would add a new area for target locations, a drop zone, landing strip, modify the restricted airspace, and modify three Military Operations Areas [MOA]. Communication between the Air National Guard [ANG] and the Nation has been minimal. Listed below are the initial comments of the HCN. The statement is not exhaustive of the comments of the Nation.

On June 6, 1995, the Nation passed Tribal Resolution 6-14-95D, a statement expressing the Nation's opposition to the Hardwood Range Expansion. Resolution 6-14-95D was re-affirmed by a vote of the Nation's Veterans, Cultural and Public Affairs Legislative sub-Committee on September 4, 1997, providing for continual support of Resolution 6-14-95D opposing the expansion of the Hardwood Bombing Range. The then articulated basis for opposition of the proposed expansion of the range was the impact on the Chak-Hah-Chee residents, that the visual Route of

Page 2 November 20, 1997

1616 directly over tribal residences and enterprises creates a nuisance, is annoying, and that the ANG flights causes a disruption during religious activities and teachings. There has been effectively no compliance with or consideration given to the AMERICAN INDIAN RELIGIOUS FREEDOM ACT OF 1978 (P.L. 95-341). That Act directs various federal agencies or departments to evaluate their policies and procedures in consultation with native traditional religious leaders to determine changes necessary to protect and preserve Native American cultural and religious practices. See 43 C.F.R. 7

The DEIS does not comment on nor consider the impact of low level flights on religious ceremonies and practices which occur through the year, primarily out-doors. The DEIS does not consider nor have there been attempts to meet with, address or mitigate any harm resulting from the impact of chemical ejections, dropping of ordnance, ground disturbance impact to possible known and unknown archaeological sites, sacred areas, and the affect of tree removal, ground run-off, and increased wind impact to these sites. The concerns for both human health, environmental degradation, and the impact on Ho-Chunk practices, religion, lodges, hunts, medicinal gathering, feasts, and ceremonies is wholly excluded from the DEIS. During several meetings at the HCN Traditional Court of Tribal Clan Leaders and during recorded court proceedings in the Nation's Trial Court, the noise and vibrations generated by low-flight aircraft has interfered with these proceedings. The disturbance is not minimal nor is it negligible to the Nation when judicial, social, religious and political activities are regularly disturbed by air-craft traversing the proposed and standard MOA. The impact adversely affects Ho-Chunk communities and the residents of those communities.

After reviewing the entire DEIS, it is the conclusion of the Nation that the DEIS is insufficient in addressing the concerns of the Ho-Chunk Nation. The ANG has not regularly nor occasionally consulted with the Nation. The DEIS does not take into consideration the cultural resources, traditional cultural properties, the medicinal gathering and sacred sites located within the proposed expansion area of the Hardwood Bombing range. As the DEIS does not address these issues and others of relative importance to the Nation, the DEIS is incomplete and has not fulfilled the dictates of the several Executive Orders and applicable federal statutes.

# I. LACK OF CONSULTATION:

The DEIS repeatedly mentions that "efforts to identify traditional cultural resources through consultation with Native American groups are on-going." DEIS Parts 3.9.3.1, 3.9.3.2, 3.9.3.3; see generally 4.9. Potential effects of aircraft noise is only one element that will adversely or possibly affect adversely these cultural resources of the Ho-Chunk Nation. No consideration, if any, has been given to limits to and denial of access to sacred sites, the limitation on or ability to gather medicinal plants and bark in the proposed expansion of restricted areas, or any other adverse impact and effect on traditional religion and observations of the Nation. Consultation with the Ho-Chunk Nation has been sporadic, infrequent, and not of a genuine nature. There has been no real dialogue or consistent communication with the Ho-Chunk Nation or its duly authorized representatives as required by 36 C.F.R. 60.4 and Executive Order 13007. The Nation, even with its continuing opposition to the proposed expansion, would also like to present possible alternatives or mitigation scenarios for the ANG to consider. This has not been allowed to happened.

# II. CULTURAL RESOURCES AND TRADITIONAL CULTURAL PROPERTIES:

The DEIS does not specifically address direct impacts to prehistoric and historic archaeological resources as a result of ground disturbances associated with construction, bombing and the expansion of the target, i.e. removal of trees, affect to water drainage patterns, laying of the air-strip, and the drop zone. The DEIS does not specifically address the degradation of the aesthetics, location and surroundings of prehistoric, historic and traditional cultural properties important to the Ho-Chunk Nation. The DEIS does mention potential degradation to such sites as a result of increased noise, which will affect enjoyment and ability of tribal members to practice religious and traditional ceremonies. Finally, the DEIS does not address the physical, audible and visual intrusions on traditional or sacred properties, save by mention of the increased noise possibly resulting from more frequent sorties. This lack of attention to these matters or an effort to address them generally or in detail fails to conform to the minimal requirements of federal laws, regulations and the Executive Orders applicable to the expansion project.

Page 4 November 20, 1997

An action results in impact when it alters the property's character. The expansion action may impact the bear, bird, conical, linear and effigy mound sites, it will affect the Ho-Chunk Nation Reservation and reservation populations, the Sunburst Petroglyph, and access to these sacred sites and places. Cultural resources are defined as any prehistoric or historic district, site, building, structure or object considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. Traditional cultural properties are one of the three major areas, which also include prehistoric and historic archaeological resources and architectural resources. Only significant cultural resources are evaluated for adverse impacts resulting from the proposed expansion of the Hardwood Range. The ANG concludes that no traditional cultural resources have been formally recorded or identified. The ANG has not considered the impact of intangible traditional cultural resources such as religion, and religious, ceremonial or traditional values that are associated with having access to lands within the proposed restricted areas, as well as minimizing the impact of frequent or infrequent noise disturbances. Protection of these resources and consideration of the impact of the proposed action involved access to sites, the use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites. The DEIS is deficient in addressing these concerns. Nor has the DEIS articulated the manner, method and frequency of communication with the Ho-Chunk Nation in order to resolve or at least address these concerns.

Historical data indicates that the Ho-Chunk Nation f/k/a the Wisconsin Winnebago, and the Menominee Nation were two of the aboriginal peoples that have used and occupied the lands affected by the proposed action. At least eight (8) historic Winnebago village sites dating to the 18th and 19th centuries are known to be in the Hardwood region. The DEIS reports that no traditional cultural resources have been "formally" recorded within the range or associated airspace. But there are sites and there are cultural resources that need to be protected. The intent of Executive Order 13007 is to provide protection for the intangible traits and character of traditional practices, natural features and sacredness of a site. The spirit of presidential declaration is not being practiced.

# III. ENVIRONMENTAL DESTRUCTION:

The DEIS reports no impacts to land use resources are expected. But the DEIS states that there will be tree removal, grading, ground disturbance, construction of fire breaks, development of service roads, maintenance buildings, construction of an air strip, in undeveloped forest, and in forested meadows and wetlands. There will be loss of vegetation and habitat. The DEIS states that the Hardwood Range is surrounded by forests and agriculture. The interior portion of the range, the target impact area, has been cleared of trees.

The DEIS suggests minor impact is expected to occur to earth resources, i.e. ground disturbance, and soil erosion, as a result of construction activities and bombing. The proposed expansion will alter drainage patterns, is likely to increase soil erosion, affect wetlands and possibly change the flood plain. Wetlands and surface water resources are present within the Hardwood ranges and to statement of clarity was provided in the DEIS on the affects to and proposed plans to mitigate damage that would be caused by the proposed expansion. The statement provided at DEIS Part 4.6.4 at 4-29, that a site development plan may minimize the local and regional consequences, does not satisfy the Executive Order 11990 requirement of federal agencies to avoid any long- and short-term impacts associated with alteration, destruction or modification to wetlands.

# IV. FAILURE TO ADDRESS ADVERSE AFFECTS ON LAND AND TRADITIONAL CULTURAL PROPERTIES OR TO OFFER A METHOD OF MITIGATION & CONSIDERATION OF ALTERNATIVES:

The ANG has taken the position that the proposed action presents a reasonable action, that the only available alternative to be considered is no action. This is an unacceptable all or nothing proposal. The Nation's concerns focus primarily on preventing harm to and minimizing unavoidable consequences are continuing damage or adverse impact to cultural properties unique or sacred to the Ho-Chunk Nation, its people, and to the history of Wisconsin. The DEIS does not genuinely address or attempt to address any issue. Most of the comments relating to cultural property, cultural resources and earth resources reference consultation with the Native Americans is on-going. Even if this characterization of communications were actuate, which it is not, on going consultation does

Page 6 November 20, 1997

not address the requirements in federal law, and the applicable Executive Orders. For example, Executive Order 11593, 1971 intended for the protection and enhancement of the cultural environment, 12 U.S.C. 470, requiring agencies to avoid inadvertently destroying properties. Also the National Environmental Policy Act [NEPA] requires that the EIS shall document the results of all cultural resources surveys conducted in addition to identifying the effects of the proposed action to identified National Register listed-eligible properties. The EIS is to describe mitigation plans to the extent they have been resolved with the SHPO and Advisory Council on Historic Preservation. Even a complete and full compliance with the NEPA process does not constitute compliance with all cultural resources legislation and regulations. Without direct information, input, definite comment on the effects or lack of impact to these resources the DEIS is incomplete and deficient as a document needed to meet the NEPA and other federal legal compliance measures. Additionally there is no plan to address access to recreational lands, hunting and fishing areas, recreational trail routes, and sacred sites that might fall within the restricted areas.

In conclusion, the Nation continues to oppose the expansion of the Hardwood Bombing range and considers the DEIS wholly deficient and incomplete as it does not address many of the concerns of the Nation. Consultation with the Nation, directly, must take place. Additionally none of the following statutes were mentioned or addressed by the DEIS, even though much of the DEIS focused on control and affect of increase noise levels, the Noise Control Act of 1972 (P.L. 92-574); the Noise Pollution and Abatement Act of 1970 (P.L. 91-604); and the Quiet Communities Act of 1978 (P.L. 95-609).



# HO-CHUNK HISTORIC PRESERVATION DEPARTMENT

ARCHEOLOGY&BURIAL SITES PROTECTION&HISTORY&REPATRIATION
P.O. Box 667 Black River Falls, WI 54615 Phone (715) 284-7181 or (800) 561-9918 FAX (715) 284-744

January 12, 1998

TO:

Rep. Gerald Cleveland, District IV

Rep. Kevin Greengrass, District IV

Rep. Robert Funmaker, District IV

FROM: Larry V. Garvin, Ho-Chunk Researcher

HARDWOOD RANGE CONTACT PERSON AT HO-CHUNK NATION

Received a telephone call this morning from Maj. Dave Beck, Camp Douglas. He would like the person(s) in charge of the Hardwood Range project to contact him to set-up a meeting with Dick Massy, Washington D.C., regarding the Environmental Impact Statement (EIS), at the earliest convenience.

Please contact Major Beck at 608-427-1441 or fax: 608-427-1329

Thank you for your attention in this regard.

c: Nettic Kingsley, Director Ho-Chunk Historic Preservation Michael Thunder, Executive Director of Administration Veterans, Cultural and Public Affairs Committee file

# THE ROCK IN THE RO

# **HO-CHUNK NATION LEGISLATURE**

Governing Body of the Ho-Chunk Nation

January 14, 1998

Maj. Dave Beck
Environmental Manager
100 Independence Drive
Camp Douglas, WI 54618-5001

Major Beck,

I am writing to confirm the date and time of the meeting with Richard F. Masse, Natural Resources Staff Officer, Andrews AFB, MD. As agreed we will meet on Wednesday, February 25, 1998 at 1:00 p.m., in the Ho-Chunk Nation Executive Office Building, Black River Falls, Wisconsin. The meeting will coincide with the regular meeting of the Ho-Chunk Nation Legislature's Veterans, Cultural and Public Affairs Subcommittee.

You can contact me at 1-800-294-9343 ext. 1262 or by Fax 608-284-3172,

Sincerely.

Dawn Makes Strong Move

Legislative Aide, Ho-Chunk Nation Legislature

Cc:

President Jacob LoneTree

Dept. of Justice, William Boulware

Historic Preservation

Ho-Chunk Nation Legislature

Legislative Counsel

file

# Meeting with Volk Field Representatives Ho-Chunk Nation Executive Office Building Black River Falls, Wisconsin February 25, 1998 1:00 PM

Present: Major Dave Beck, Environmental Manager, Volk Field
Richard Masse, Natural Resources Program Manager, Andrews Air Force Base
Lt. Col. Larry Young, Operations Officer, Volk Field
William Boulware, Tribal Attorney, HCN Department of Justice
William Gardner, Legislative Counsel, HCN Legislature
Karen Martin, District V Representative, HCN Legislature
Robert Mudd, District I Representative, HCN Legislature
Dawn Makes Strong Move, Legislative Aide, HCN Legislative Aide

Meeting was called so that we could jointly go over the issues raised in the Nation's response to the Draft Environmental Impact Statement.

Discussion focused on matters pertaining to the location of various traditional or archaeological sites, which do or may lie within the proposed expansion of Hardwod Range. The first priority was the non-disclosure of traditional religious sites. The ANG representatives agreed they would do their best to insure that the location of culturally sensitive areas would remain confidential. Also discussed were the effects that ANG activities would have on traditional practices and settlement areas.

Major Dave Beck asked if the Nation would be willing to indicate the regional areas containing any traditional religious or cultural sites on a map. Even a general indication of the area, not a description of the activities, was needed so they could label the areas as sensitive and then direct pilots to avoid these sites by going to the extreme opposite end of the corridor and therefore make as little as possible disruption. Dick Masse wanted to know if the Ho-Chunk Nation could ask their GIS department to pinpoint known affected areas on a map. Mr. Masse asked us if it is possible for tribal members to give the ANG advanced notice of these activities so that flights could be scheduled away from the activity site. The ANG does not want to know the nature of the religious or cultural activities, they would only like to know the times and location of any cultural activities so that pilots can avoid the area and therefore not disrupt religious and cultural events.

Larry Young, Operations Officer, Volk Field said that a one day to one half day minimum notice was all that was required. For instance, if a ceremony were planned to begin the next morning then notice given by 4:30 p.m. the previous evening would be sufficient time to accommodate rescheduling by the ANG. Likewise if a ceremony was planned for the evening, then notice given by 9:30 am that day would allow the ANG sufficient time to reroute planned flights. The general consensus of all those present was that there would be some direction or some effort made by both the Nation and Lt. Col. Larry Young, of Volk Field, to develop a formal protocol procedure. This jointly developed procedure would identify flight areas and deal with noise concerns, as well as

provide the means to communicate the concerns of tribal members and others to the ANG when a plane went off course or disturbed sensitive areas. Discussion followed about how to make this protocol accessible to the public, be it the Tribal newspaper or various other manners.

Additional discussion had to do with further archaeological inspection once expansion of the site was obtained and how these things might be dealt with. The ANG representatives will continue to consult the Nation on these issues and they agreed to do their best to ensure that there is little impact on the cultural resources which are found within the proposed expansion area.

Dick Masse stated that if a briefing for Area I and IV tribal members was necessary, to let him and the other Volk Field representative know, and they would be willing to attended the meetings and answer questions.

Also there was discussion regarding the flight corridors, these being roughly 6-7miles wide, starting from 300-500 and extending up to 1500 feet above ground. Dick Masse said that flight within these corridors was a Federal Aviation Administration (FAA) requirement. We were shown these flight corridors on a map, which is now in Dawn's possession. There was also general questions regarding FAA and aerospace matters, at which time the map was explained more fully. This included discussing why the flight corridors could not be changed and how difficult it was to change established routes, Military Areas of Operation and exclusive areas of Military of Operation and how the FAA can apparently close up certain areas and deny access to general areas of flight.

Some issues concerning the ecological impact of the proposed expansion were covered. When questioned about spills, that are the result of aircraft mishaps, specifically fuels or hydrazine, the general answer was that if any did occur, the Military would be responsible for any clean up.

The final summary of the meeting was that there was an agreement to meet again. All agreed to the need to enhance communication between tribal members and the ANG and set up protocol for notification, and to deal with the issue of locating the areas or regions. In the event there is a need to have them present at the Area I or IV meetings the ANG members are willing to attend and to present information if necessary. I explained that although there were 6 members available for those two areas any vote had to be taken by the full legislature as the legislature was responsible for dealing with the nation's traditional cultural properties. There was also an offer to take interested members of the Legislature, or staff, on a flight over the proposed expansion area. The ANG said that the first week of April was an acceptable time for them to meet with Area I and IV tribal members, especially since the ANG plans to have the final EIS completed by late spring.

Respectfully,
Dawn D. Makes Strong Move
Legislative Aide, Ho-Chunk Nation

# MEMORANDUM FOR Mr. Harry Knudsen/LTC Kent Adams

SUBJECT: Visit to the Menominee Tribe, Kenosha, WI

1. On 26 February 98 I met with the Menominee tribe in Kenosha, WI to discuss the Hardwood Range expansion. The meeting was with Mr. David Grignon, Director of Historic Preservation and covered an explanation of the proposal, map depictions of the area to be acquired, the need for the expanded area, and the use to which the military would make of the area. We also discussed the necessity for doing archaeological work on the expanded area at some future date, and the involvement of the Menominee if and when that becomes an issue. We promised to continue the dialog as we continue through the process depending on the outcome of the proposal.

Dick Masse, GM-14

Natural Resources Program Manager



# DEPARTMENT OF THE AIR FORCE AIR NATIONAL GUARD

27 Jul 1999

Mr. David C. Van Gasbeck Chief, Environmental Division 3500 Fetchet Avenue Andrews AFB MD 20762-5157

Mr. Jacob Lonetree
President, Ho-Chunk Nation
W 9814 Airport Road
P.O. Box 667
Black River Falls, WI 54615

Dear Mr. President.

During the last several years, members of the Ho-Chunk Nation, my office, and our unit at Volk Field have met several times and spoken by phone many times in order to maintain an on-going relationship relative to tribal interests and ANG activities. We've found that many of the tribal legislators or staff members that we have regularly spoken with have left for other pursuits. As recently as last month, we were working with Mr. Robert Mudd to determine if it was time to meet again formally, however, I understand that Mr. Mudd has left his portion in District 1.

In February of 1998, representatives of both the National Guard Bureau and Volk Field met at the Ho-Chunk Nation Executive Office Building in Black River Falls. The outcome of the meeting was an agreement to continue meeting and work together to develop protocols so that religious and cultural activities and resources are afforded as much protection as possible.

I would like to propose that a meeting take place in August with key members of your legislature and Volk Field personnel, to further discuss ongoing issues related to the Hardwood Range expansion addressed at earlier meetings, and any new concerns you may have regarding our ongoing or future activities. This would also allow us to meet your new personnel. Please have a member of your staff contact Mr. Dick Masse at 301-836-8862 at your convenience. Thank you.

Sincerely

DAVID C. VAN GASBECK

Chief. Environmental Division

Mr. David C. Van Gasbeck Chief, Environmental Division 3500 Fetchet Avenue Andrews AFB, MD 20762-5157

VIA CERTIFIED MAIL

Mr. Jacob Lonetree President, Ho-Chunk Nation W 9814 Airport Road P.O.Box 667 Black River Falls, WI 54615

Dear Mr. President,

In a July 27, 1999, letter, we offered to meet with you to provide the Ho-Chunk nation with information regarding the Hardwood Range Expansion Environmental Impact Statement (EIS). We were particularly interested in hearing of any of the Ho-Chunk Nation's concerns regarding potential impacts to cultural resources. We did not receive a response to our July 99 letter and would like to repeat our offer.

The Air National Guard (ANG) hopes to hear the Ho-Chunk's concerns about the Hardwood Range expansion and we hope to resolve all outstanding cultural resources issues. Specifically, the tribe's Nov. 20, 1997 comment letter on the Draft EIS identifies a number of important issues, such as aircraft noise, access to sacred sites, and gathering of natural objects important to the Ho-Chunk's religion. We have had a long process of consultation with your tribe dating back to 1996. This consultation has resulted in several meetings, letters, and phone communications between us. (A chronological summary of these activities has been summarized in Appendix O of the EIS.) We are very committed to having a meaningful dialogue and concluding this consultation process.

Mr. Dick Masse will be visiting Volk Field in February and would like to meet with you and/or your representatives to discuss each of the tribe's concerns about the Hardwood project. At the ANG's last meeting with the tribe, we agreed to continue to discuss ANG activities relating to Hardwood Range as the process moved forward. The ANG is required by the National Environmental Policy Act, the National Historic Preservation Act, and Executive Order 13084 to ensure that the tribe's concerns are given proper consideration.

If you have a preferred date on which you would like to meet with Mr. Masse, please let him know. He can be reached at 301-836-8862. I am hopeful that once the tribe is

provided with more recent specific facts about the proposed Hardwood Range expansion, the Ho-Chunk nation will add its support to this important endeavor.

Sincerely,

DAVID C. VAN GASBECK Chief, Environmental Division